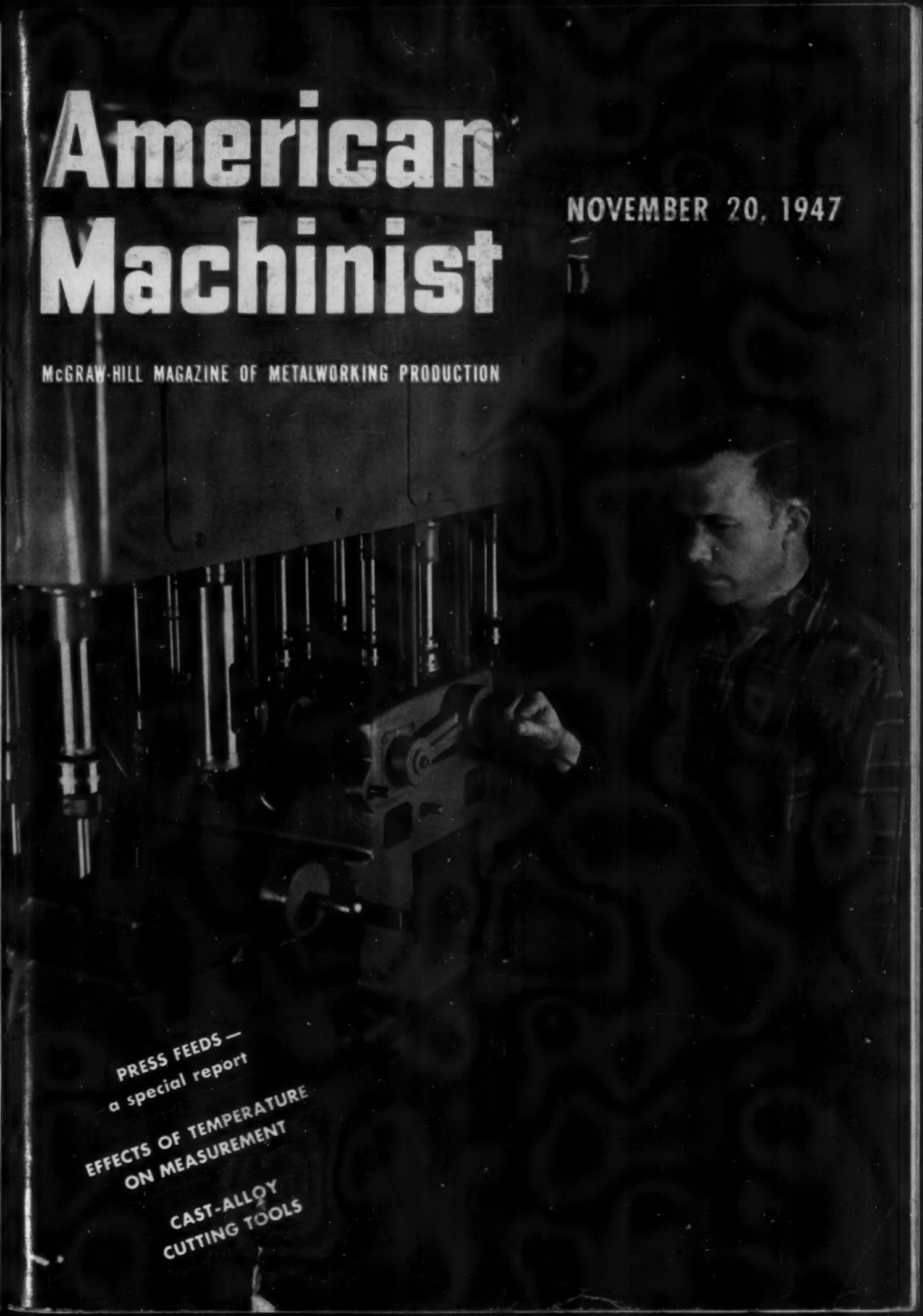
American Machinist

NOVEMBER 20, 1947

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



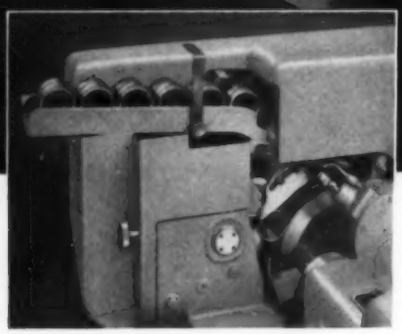
PRESS FEEDS—
a special report

EFFECTS OF TEMPERATURE
ON MEASUREMENT

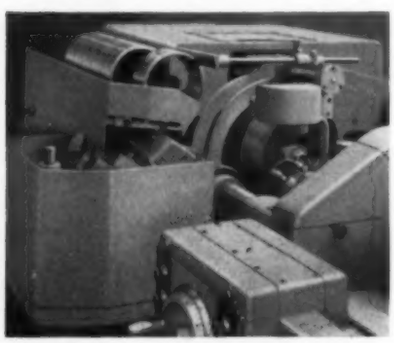
CAST-ALLOY
CUTTING TOOLS

COMPLETELY NEW!

Completely Automatic GRINDING!



● Automatic loading and positioning of parts in workhead of new Model 281 Centerless.



● Model 381 Centerless workhead with new automatic loading device for large work.

On a brand new line of Heald Centerless Internals

There's no comparing these new Heald Centerless Internals with any others. From base to bridge, they're *completely new*—completely different in design and performance. And they handle a wide range of cylindrical work—wider than ever before.

Peg your production rates high. For these are high-capacity, high-production, high-precision machines . . . each with continuous and completely automatic cycle (loading through unloading) . . . each grinding "the centerless way" for uniform wall thickness, perfect concentricity, and errorless reloading. They offer you:

GREATER ACCURACY AND PRODUCTION. Base and wheelslide more rigid . . . feeds and table action uniformly constant throughout the day, remaining so without adjustment . . . wheelhead and work rotation smoother.

QUICKER SETUP. Individual, graduated knobs set feed rates and table speeds . . . quickly adjusted reverse dogs set table stroke.

MINIMUM MAINTENANCE. Valves mounted in front for easy accessibility . . . steel hydraulic tubing means leak-proof joints . . . electrical controls grouped at rear . . . isolated power unit rolls out from base.

Consult Heald branch office nearest you, or write for free bulletin on the 281-381 Centerless Internal Grinding Machines.

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Chips and QUIPS

Our Cover . . . 30 cast-iron cylinder heads are produced per hour in this Natco 2-way combination vertical and horizontal "Holetapper." The vertical unit has hydraulic traverse, the stationary horizontal unit has reversing motor drive; fixed-center gear-driven heads contain a total of 22 tapping spindles with individual lead screws and tap lubrication.

The machine has a Natco 4-position stationary fixture, holding one cylinder head in each position. In the sequence, 7 holes are tapped in first position, 7 in second, 2 in third and 4 in fourth, the latter two positions being with spark-plug holes in the casting up.

Persistence Rewarded . . . Few readers realize how much preparation may be required for a single good article, both by original authors and in editing for publication. We present in this issue, however, two shining examples of long-term persistence, each almost exactly two years in the writing.

Our special report on Press Feeds was initiated over two years ago as a series of articles, has been in rough-written form for more than a year. But engineers of E. W. Bliss Co. have been checking and polishing since, selecting illustrations, clarifying some points and adding others. Then we compressed and streamlined their product, to deliver it to you in one compact and highly usable package rather than in half a dozen installments.

W. F. Scholtz's article on control of dermatitis has been promised for almost as long. It's worth the wait, however, because it shows how proper care and an intensive educational program at Allis Chalmers cut occupational dermatitis 73.8%. Incidence of cases was cut from 10.3 to 2.7 cases per million manhours of exposure. Here's the story of how it's done.

Cast Tools . . . Cast alloy tools of the cobalt-chrome-tungsten type can handle interrupted cuts and special jobs—if they're made and handled correctly. J. B. Dym and T. Badger of the Headquarters Mfg. Lab., Westinghouse, investigated breakdown of such tools, their service life, effects of speed and feed changes, proper grinding and so on. They found wide variation in results, caused both by variation in material and in use. They report results for your guidance.

And . . . Tony Zino continues his series on petroleum oils for hydraulics, A. H. Waychoff presents more Short Cuts, and regular departments complete this issue. As usual, reprints of the special report are available by writing to the Editor, for 25 cents each, with a reduction for quantities.

Help Finland . . . Arthur E. Morgan, of the American Friends Service Committee, writes that Finland has an excellent technical institute, Teknillinen Korkeakoulu. During the war, its library was bombed and totally destroyed . . . Dr. Martti Levon, director of the Institute, told Dr. Morgan recently that he would welcome gifts of scientific and technical books and periodicals from America to replace those destroyed . . . Here is a real chance to aid recovery in a nation that holds America in high regard. Gifts should be marked for the Institute of Technology, Helsinki, and sent to the Legation of Finland, 2144 Wyoming Ave., N. E., Washington, D. C. Dr. K. T. Jutila, Finnish Minister, will arrange for their shipment to Finland.

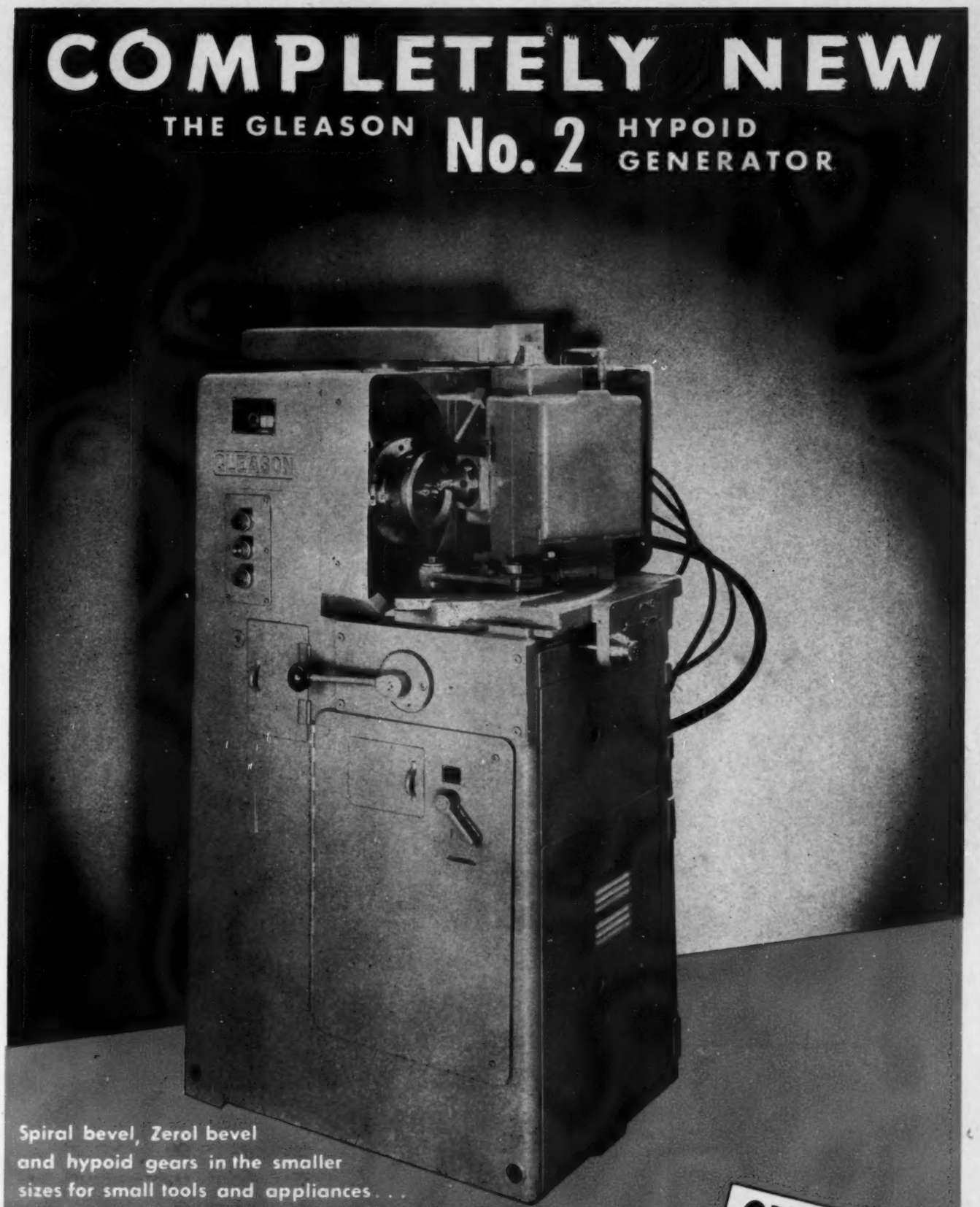
Coming . . . Dec. 4 *A.M.* leans strongly toward tooling, presswork and welding. We hope to present also a detailed analysis of the Marshall Plan, based on latest data . . . Articles deal with some built-from-surplus presses and fixtures for building a truck body efficiently, Wallace Mills' excellent ideas on tooling for forming open and lock-seamed cylinders in thin metal, details of Ford's methods of freezing soft-metal dies to form a few experimental parts at negligible cost . . . There'll be our usual complement of preferred departments, more of Tony Zino on hydraulic oils, Fred Craib's recollections of tough days in a machine shop, and other features.

ASSOCIATE . . . H. E. Linsley, born and educated in England, served as a flying officer in the R.F.C. during the first World War. After several years in Paris, where he was asociated with the National Radiator Co., he came to the U.S. in 1927. Following a year with Pierce Arrow Motor Car in Buffalo, Jim joined Curtiss Aeroplane & Motor as a tool engineer. In 1933, after Curtiss was merged with Wright Aeronautical, he became a production engineer. As the result of many articles written for the technical press, he was transferred to the Public Relations Dept. In 1940, and subsequently took charge of all technical publicity. In this capacity, he traveled extensively throughout the U.S. as a speaker at both technical and non-technical meetings. He is a member of a number of technical societies.

In 1945 he became machine-tool editor of The Iron Age, and has recently joined the staff of *A.M.* as associate editor.

COMPLETELY NEW

THE GLEASON No. 2 HYPOID GENERATOR

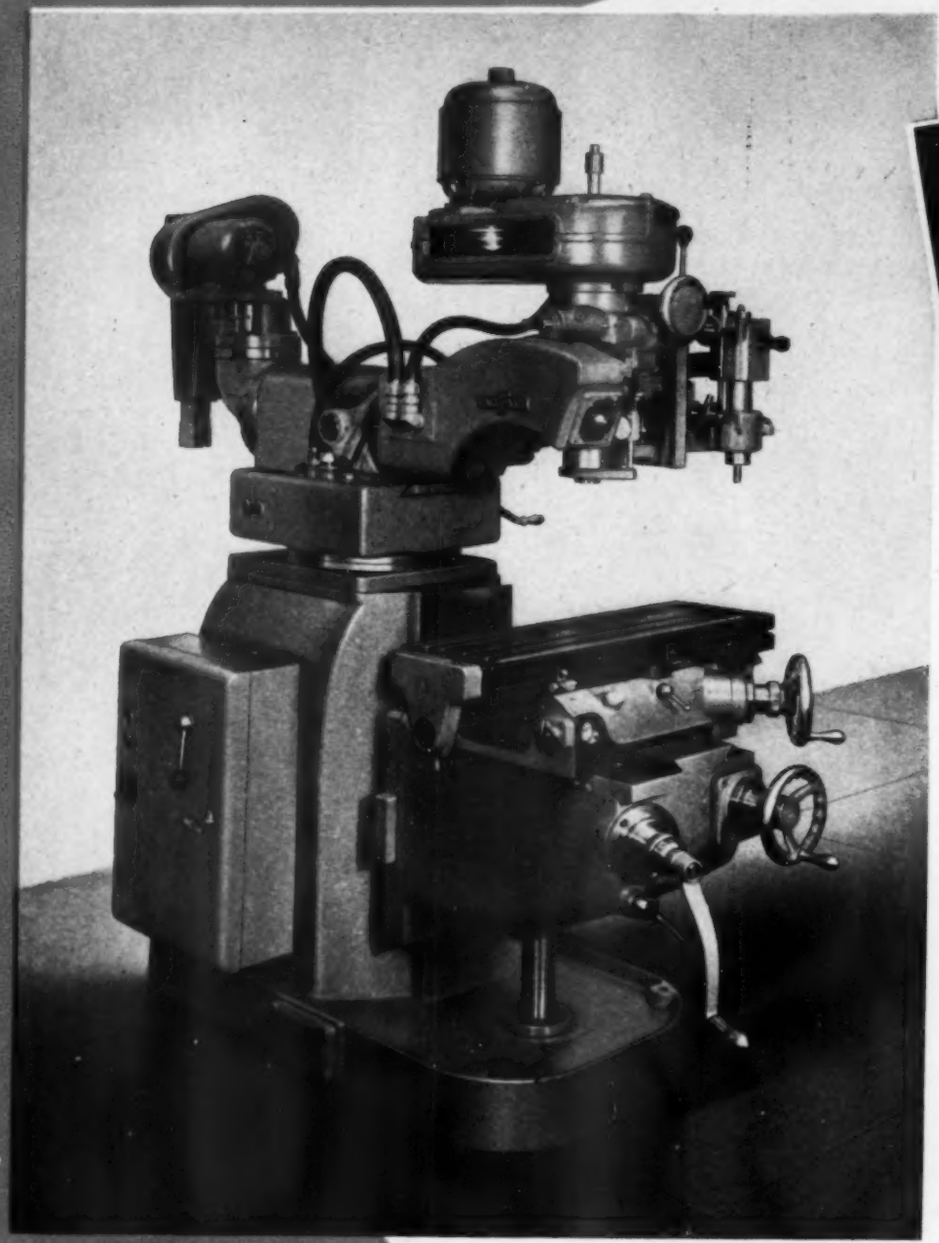


Spiral bevel, Zerol bevel
and hypoid gears in the smaller
sizes for small tools and appliances . . .

better bevel gears cut at faster speeds than previously possible . . . hypoids in very small sizes from hypoid miters to high reductions of an extreme ratio of 45 to 1, superior tooth bearing made possible through closer control of actual cutting with many new machine features.

GLEASON Works
1000 University Avenue
Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years



It has

Illustrated at left is the CINCINNATI 8" x 18" Tool and Die Milling Machine. Catalog M-1620 will be sent on request.

CINCINNATI

THE CINCINNATI MILLING

MILLING MACHINES

all the features you wanted for TOOL and DIE MAKING

The way to design a better potato peeler . . . or a better machine tool . . . is to ask the user what he wants. That's what our engineers did before designing the new CINCINNATI 8" x 18" Tool and Die Miller. This machine is the outcome of an extensive survey among mold and die makers, and as a result, it has everything they asked for. It's built for rapid, economical production of plastic molds, permanent molds, metal patterns, die-casting dies, and small drop forging dies. Here are a few of the outstanding features:

1. Hydraulic automatic duplicating unit; responds to exceptionally light contact pressure.
2. Anti-friction feed screws and nuts for table and cross movement, with front handwheel control.
3. Universal mounting of spindle head, may be swiveled four ways.
4. Ram type mounting of spindle carrier support provides extra cross range.
5. Slotting attachment available for one end of spindle carrier support, turret mounted, may be swiveled 180°.

Many other features, and complete engineering specifications are contained in catalog M-1620. Write for a copy.

MACHINE CO. CINCINNATI 9, OHIO, U.S.A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

Every 10

Fellows 3" Fine-Pitch Gear Shaper with magazine feed for the automatic generating of small fine-pitch pinions.

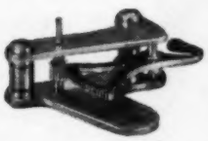
• **HAVE YOU SEEN** the latest in gear science... the Fellows sound motion picture in natural color..."Highlights of the Art of Generating and Gear Manufacturing Equipment." Contact Springfield, Vermont, or our local offices for booking appointments.

THE FELLOWS METHOD... MACHINES AND TOOLS FOR

Minute!

with Generated Involute Teeth

Automatic Magazine Feed and Ejection on the Fellows 3" Fine-Pitch Gear Shaper produces high-accuracy Involute-Tooth Pinions...600 per hour!



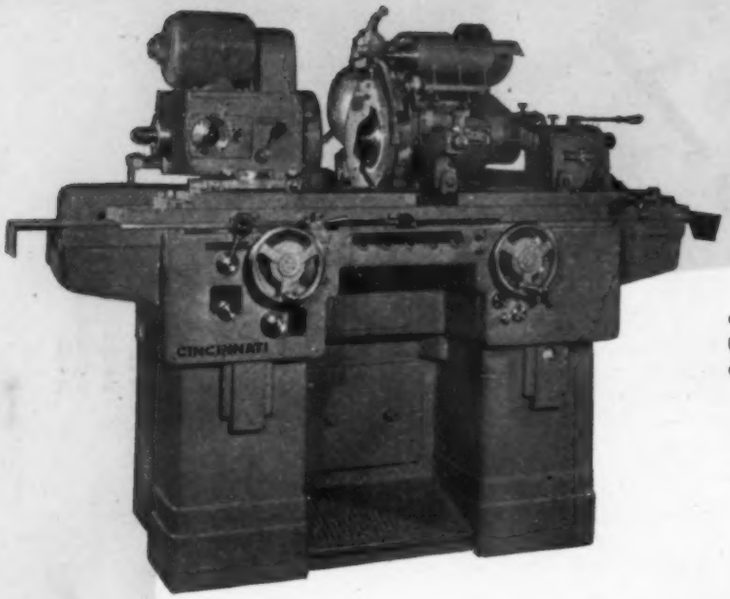
Small fine-pitch instrument gears...as fine as 64, 80 or even 200 pitch...are contributing to the quiet, smooth operation of many precision devices, as electric clocks, meters, microscopes, and motion picture cameras.

Involute accuracy at extremely high cutter speeds, coupled with magazine feed afford precision duplication of this 113 pitch pinion ...at the amazing production rate of ten every 60 seconds!

For the mass production of small fine-pitch gears, pinions, and precision instrument parts, the Fellows Fine-Pitch Gear Shaper is in a class by itself. Descriptive literature awaits your request. The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2 . . . 640 West Town Office Bldg., Chicago 12, 7706 Empire Bldg., New York 1.

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

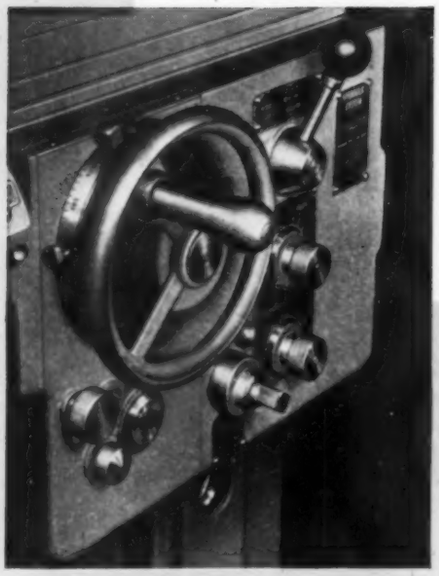


CINCINNATI FILMATIC 10" Hydraulic Universal Grinder. Write for catalog G-549-1.

CINCINNATI

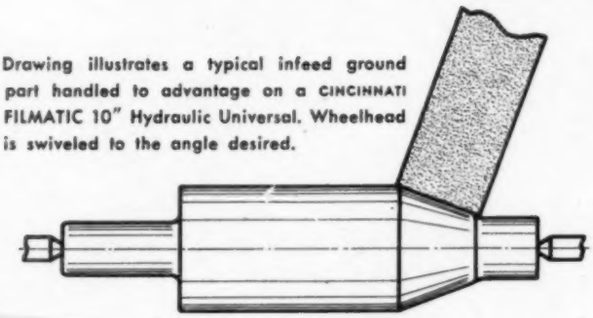
it changes "vs" to "and" in

VERSATILITY ~~vs~~ and HIGH PRODUCTION



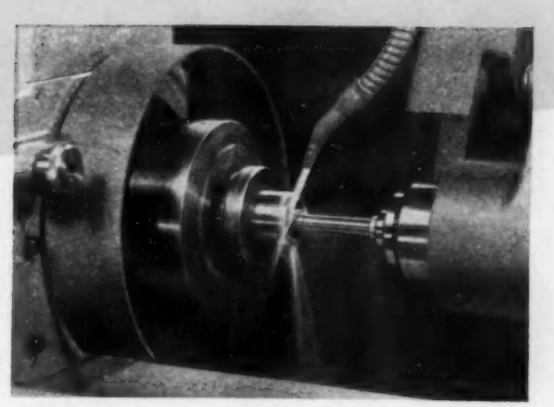
AUTOMATIC INFEED makes the machine a high producer.

Drawing illustrates a typical infeed ground part handled to advantage on a CINCINNATI FILMATIC 10" Hydraulic Universal. Wheelhead is swiveled to the angle desired.



CINCINNATI

CENTER TYPE GRINDING MACHINES

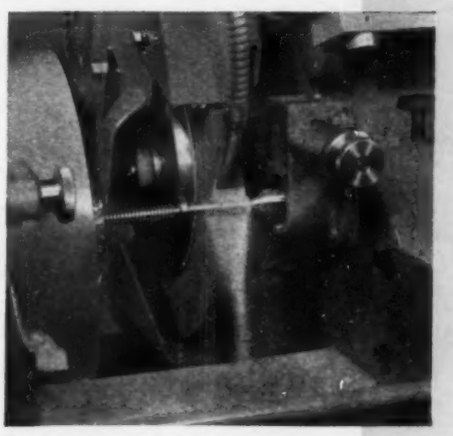


Left: For INTERNAL GRINDING simply pull attachment down and fasten in place.

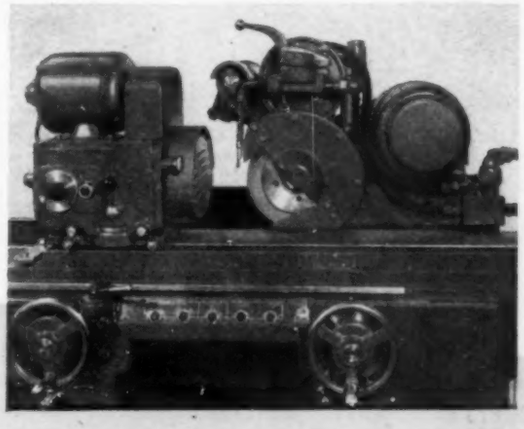
When you select your next precision universal grinder, there need be no conflict between versatility and production, for you can get *both* in the new CINCINNATI FILMATIC 10" Hydraulic Universal. It has all the universal features you might expect, plus:

Hinged internal grinding unit for quick setups. Electronic headstock drive provides instant selection of the right speed, infinitely variable from 50 to 600 rpm. FILMATIC grinding wheel spindle bearings; they never require attention of a service man. *And:* wheel mount interchangeable from left- to right-hand end of spindle (additional equipment). *And:* manual or automatic production infeed (additional equipment).

Many other features give these FILMATIC Universals undisputed claim to the title "the most universal Universal grinder." Complete description and engineering specifications may be obtained by writing for catalog G-549-1.



EXTERNAL GRINDING. The machine handles an unusually wide variety of parts in any quantity.



Left: FACE GRINDING with wheel on the right-hand end of the spindle.

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Van Norman

RAM TYPE MILLING MACHINES

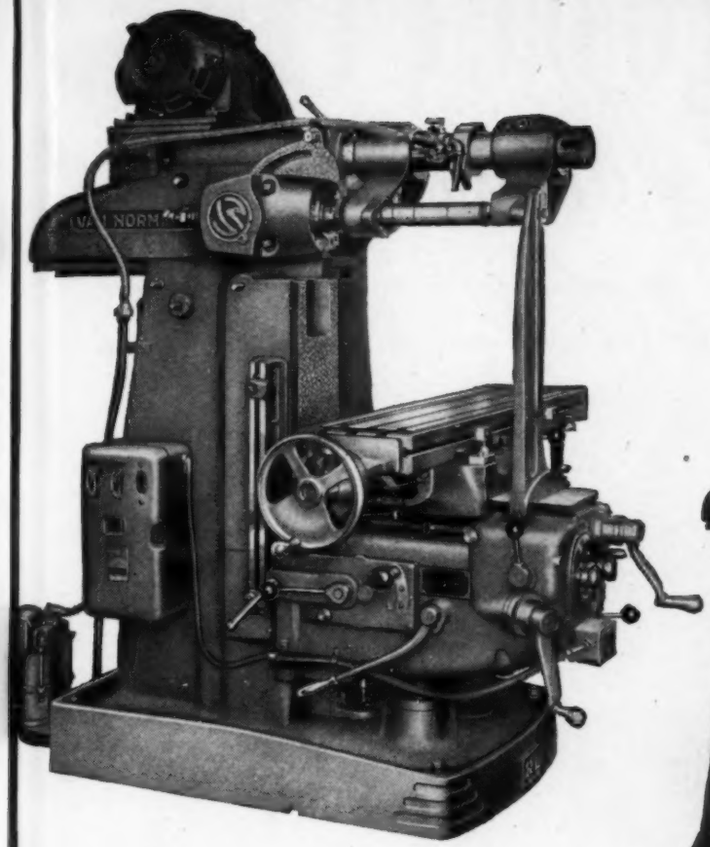
Handle Most Milling Jobs without Attachments

Do your milling requirements vary from job to job, day to day? Van Norman Ram Type Millers will solve your problem by permitting you to perform conventional horizontal or vertical as well as angular milling *all* on *one* machine. All you have to do is swivel the adjustable cutterhead to the required type of milling, set up the work and you're set to do the job.

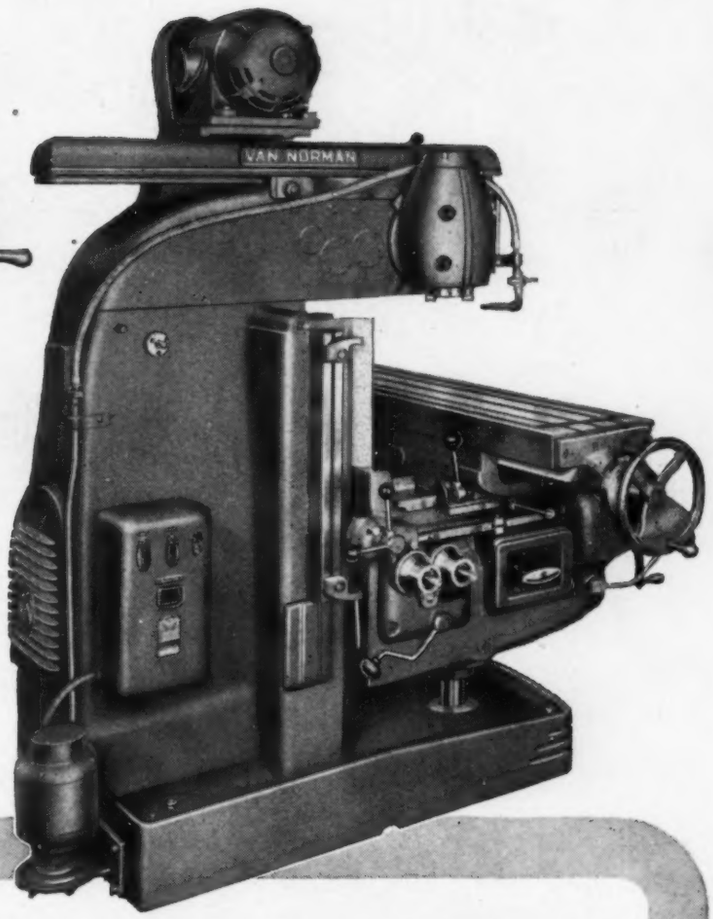
In addition, these versatile millers save you time and increase production by minimizing work reset-up because you swivel the cutterhead instead of changing the set-up.

Van Norman Ram Type Millers enable you to meet all milling jobs and cut costs in the tool room, machine shop, experimental laboratory, tool and die shop and pattern shop. They are available in 16 models. Write for complete details and catalogue describing these machines today.

"IT PAYS TO VAN NORMANIZE"



No. 22L
Head Horizontal



No. 26
Head Vertical

VAN NORMAN RAM TYPE MILLERS

No. 36	Table:	58 x 13 in.	No. 22M	Table:	50 x 10 in.
No. 26	Table:	50 x 12 in.	No. 12	Table:	32½ x 9⅜ in.
No. 22L	Table:	45 x 10 in.	No. 6	Table:	26¾ x 6⅞ in.

Van Norman Ram Type Models are made with plain or universal saddles.

These millers come in numerous special models which have a higher column providing greater distance between center of spindle and top of table. The machines are especially useful in applications encountered in pattern and die work which require a greater vertical range than available in standard models.

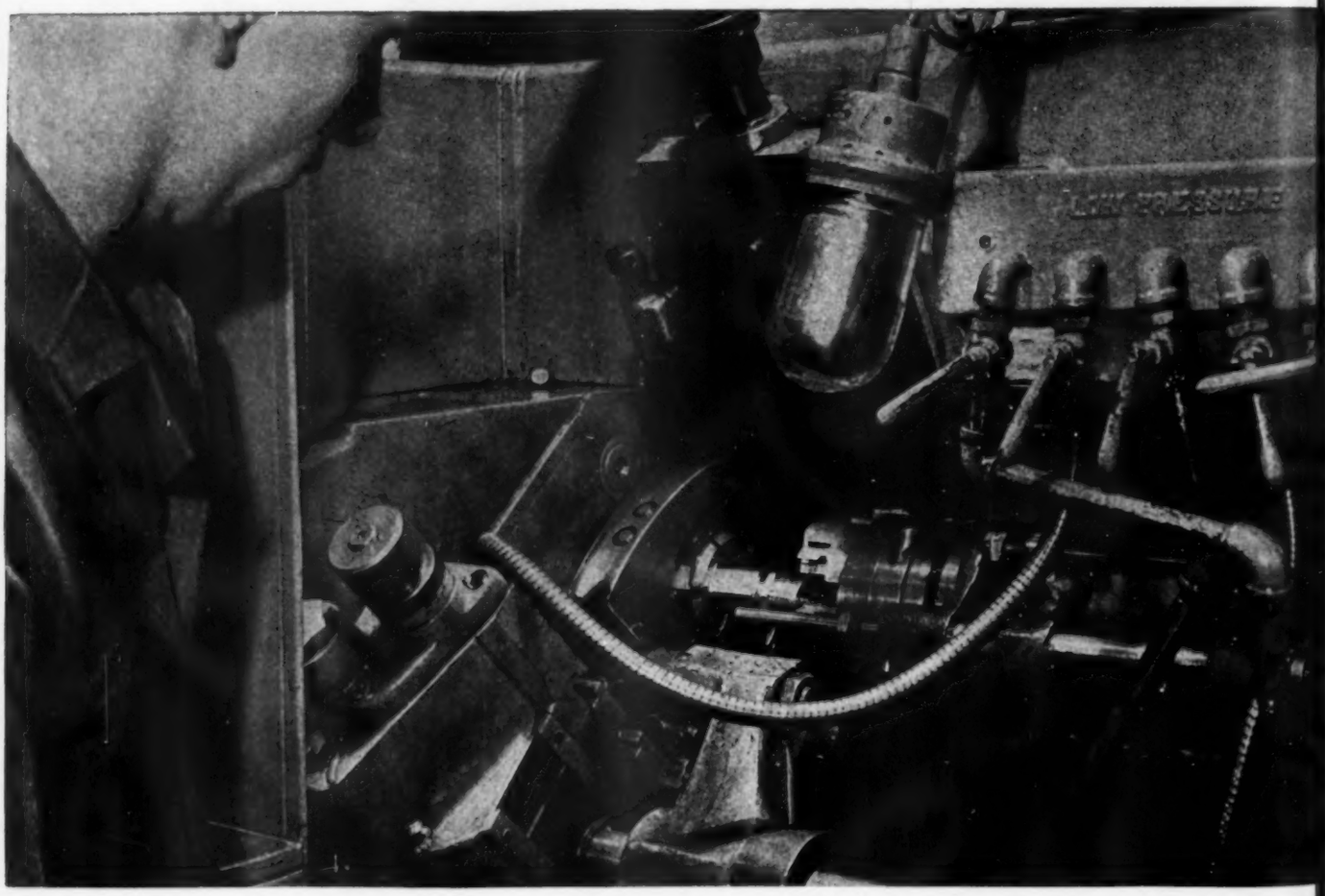
VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

Designed for PRODUCTION,

LANDEX HEADS.....FOR AUTOMATIC

LANDIS
REG. U.S. TRADE—MARK PAT. OFF.

• In the illustration, the Type J LANDEX Heat Treated Head is being used on an automatic screw machine to produce 15/16" diameter 16 pitch threads on stainless steel hex head bushings.



The LANDIS CHASER

LANDIS

WAYNESBORO

PRECISION, & ECONOMY

& SEMI-AUTOMATIC SCREW MACHINES

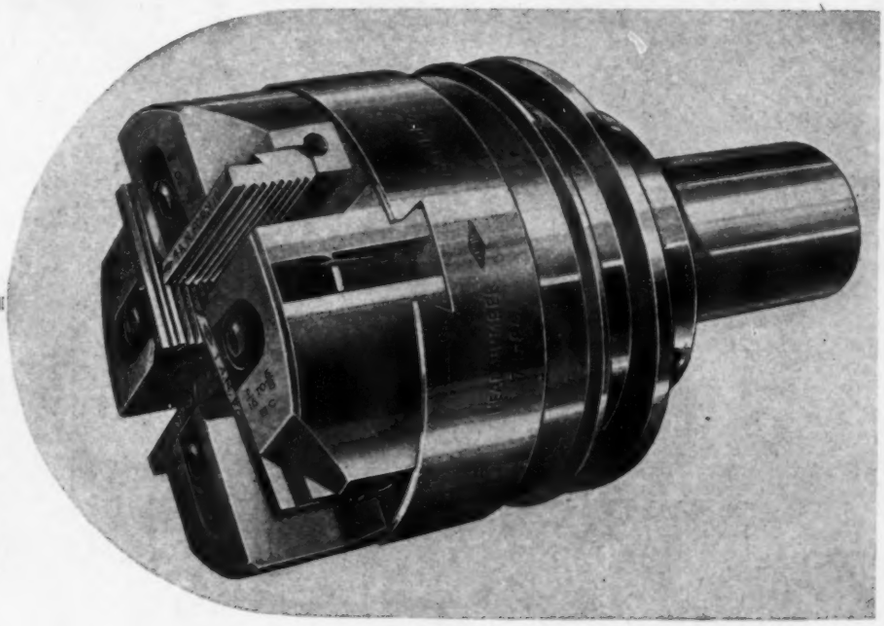
Write for Bulletins

F-90—Heat-Treated

F-80—Hardened and Ground

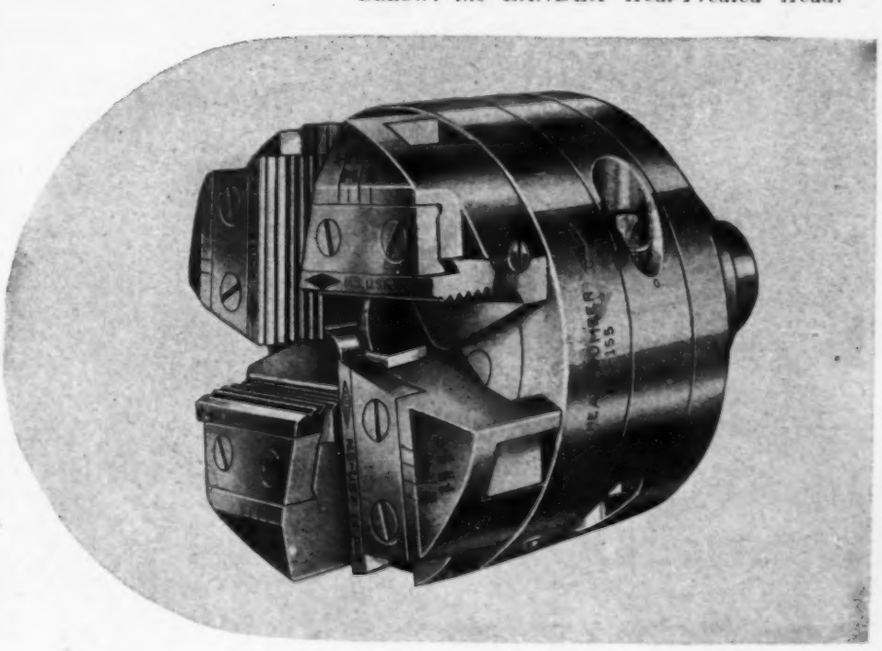
LANDEX Heads are built of tough alloy steel, and have the sturdy, rigid construction so essential for tools to be used for threading stainless steel parts on a high production basis.

Free cutting action of the threading tool is of utmost importance when producing threads on stainless steel and other similar materials. The Landis Tangential Chaser, used exclusively in the LANDEX and other Landis Heads, provides the free cutting action which assures smooth finished threads and the long tool life which results in minimum threading cost.



ABOVE: *the LANDEX Hardened and Ground Head.*

BELOW: *the LANDEX Heat-Treated Head.*



MACHINE COMPANY

PENNSYLVANIA · · · U. S. A.

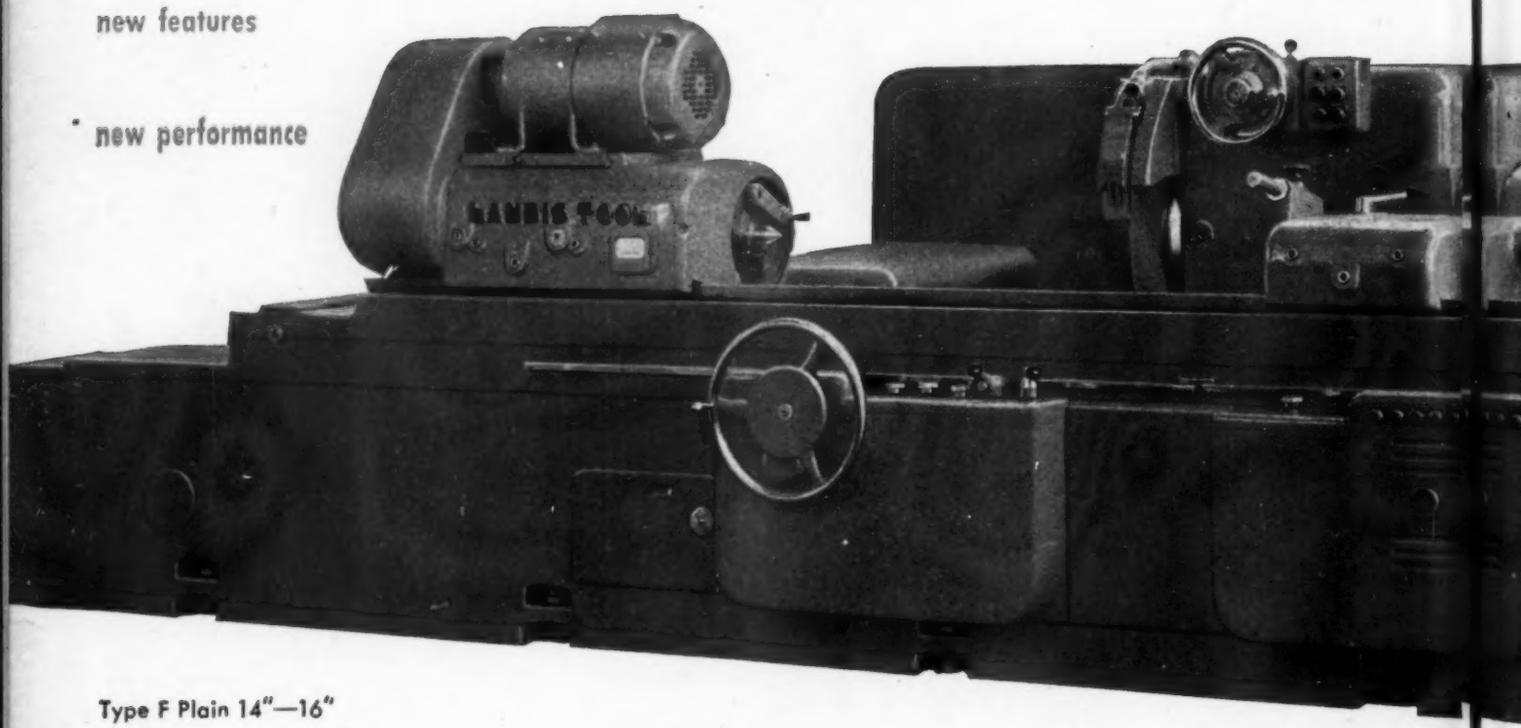
Announcing

a NEW LANDIS TOOL plain hydraulic

new design

new features

new performance



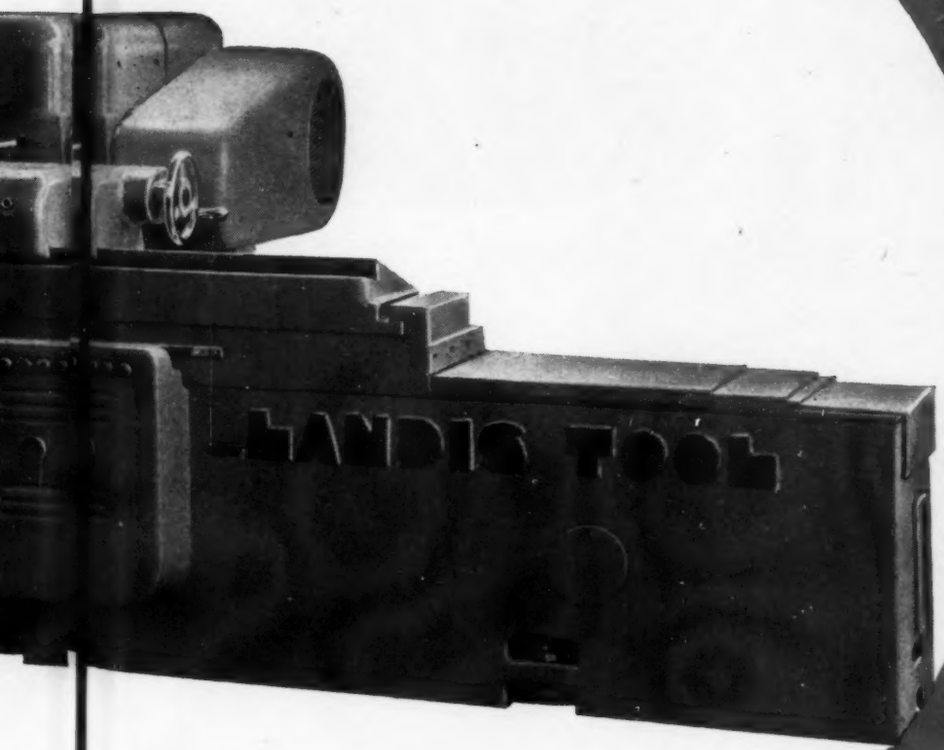
Type F Plain 14"—16"
Type FF Plain 16"—20"—24"
Type FR Roll 16"—20"—24"

LANDIS TOOL
Precision Grinders

76

grinder

EQUIPPED WITH MICROSPHERE BEARINGS



CONVENIENT OPERATING CONTROLS

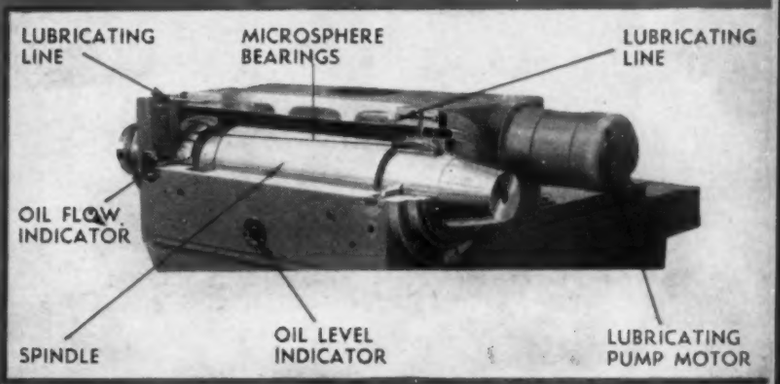
summary of features

standard features

- All Controls Convenient for Operator
- Hydraulic Work Traverse
- Headstock Driven by Adjustable Speed Motor
- Convenient Coolant Reservoir Cleanout
- Telescoping Guide Covers
- Sensitive Taper Adjustment to Swivel Table
- Electric Motors and Controls Built-in

optional features

- Headstock Spindle Speed Indicator
- Hydraulic Rapid Infeed
- Rapid Electric Traverse Wheel Base Movement
- Gapped for Piston Rod Grinding
- Wheel Spindle Speed Indicator



PRESSURE LUBRICATED MICROSPHERE SPINDLE BEARINGS

LANDIS TOOL COMPANY
WAYNESBORO, PENNA.

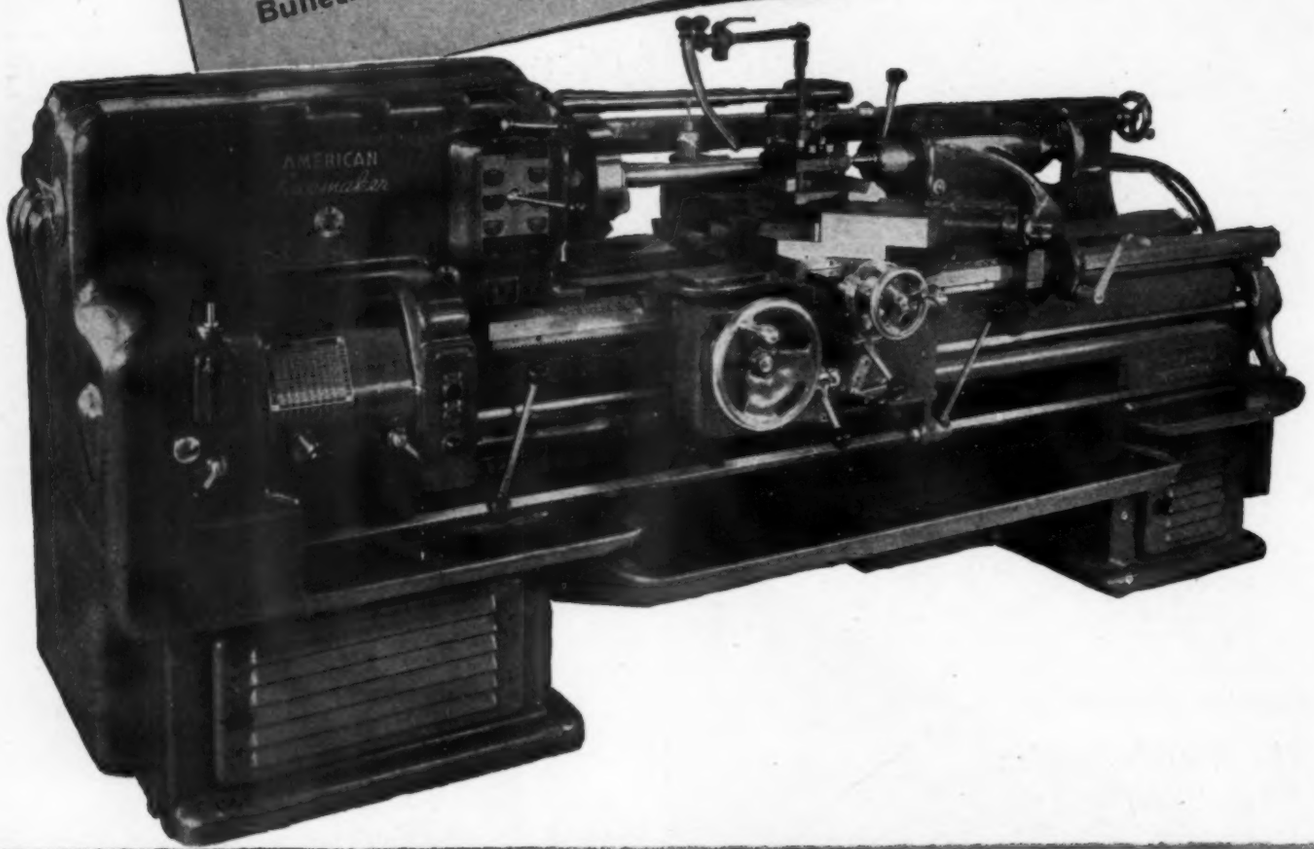
SHAFT PRODUCTION COSTS

hit a new low

The new "American" "H S-D" (Hydraulic Shaft-Duplicating) Lathe presents to the metal-working industry a new and revolutionary technique for the production of various types of shafts. Other methods are now outmoded by this new development. Production costs have hit a new low. Piston rods that formerly took over 4 hours are now produced on this lathe in 36 minutes.

Write for descriptive literature—Bulletin No. 35.

This shaft is being machined complete; floor to floor time, 18 minutes.



THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

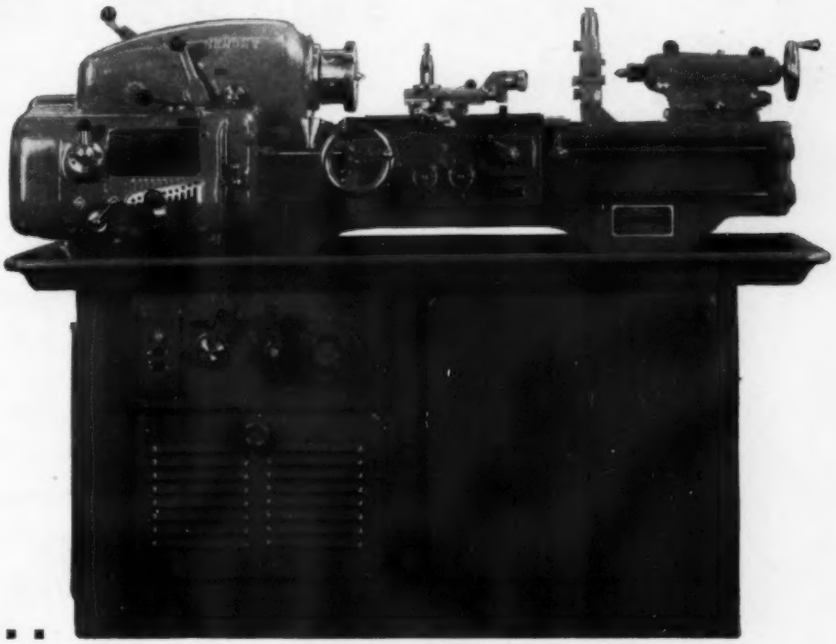
HSD

THE NEW HENDEY 9"x 24"

TOOL AND GAGE MAKER'S LATHE

GIVES YOU THESE LONG-WANTED FEATURES

1. *Greater Capacity* — 1⅛" maximum capacity of Spring Collets.
2. *Finer Control* — 66 different feeds, 66 different threads without gear change.
3. *Higher Speed* — Up to 2000 r.p.m. forward and reverse.
4. *Greater Sensitivity* — Stepless speed over entire range provided by DC power unit.



AND MORE . . .

To insure precise production the new Hendey 9"x24" has these additional features. Hardened and ground spindle runs in super precision, preloaded, anti-friction bearings. The lead screw is held to .0005" per foot of lead and is used only for thread cutting. A separate feed rod, independent of the lead screw, is provided. Lubrication is automatic throughout.

The new Hendey 9"x24" is the precision lathe that fulfills a long standing desire of tool and gage makers everywhere. Full information on this highly accurate, sensitive and versatile lathe, is contained in the new 9" x 24" catalog—send for it today.

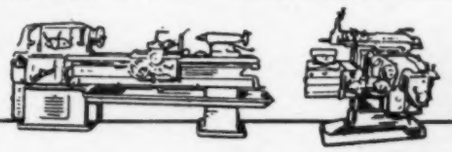
The Hendey Machine Company

Hendey

Main Office and Plant — Torrington, Connecticut

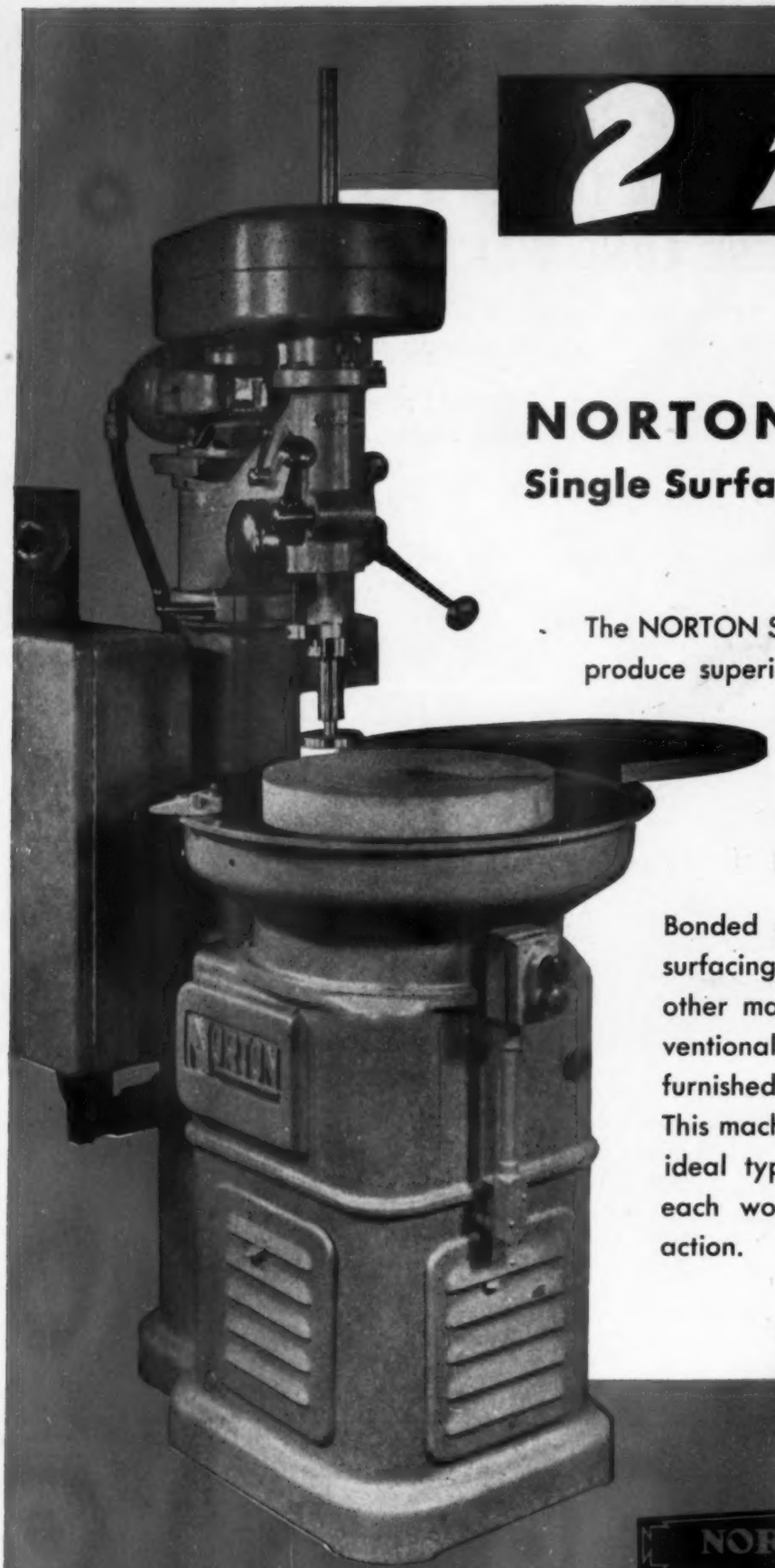
Offices — N. Y., Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco

Representatives in — Philadelphia, Cleveland, Pittsburgh



TOOL ROOM LATHES
12" - 14" - 16" - 18" - 20"

SHAPERS
12" - 16" - 20"



2 NEW

NORTON SEAL-O-LAP
Single Surface Lapping Machine

The NORTON SEAL-O-LAP Lapper is designed to produce superior seal surfaces economically on the component parts of rotary seals. It finishes these surfaces to low micro-inch readings and to optical flatness.

Bonded abrasive laps are furnished for surfacing seals made of carbon, bronze or other materials difficult to finish on conventional metallic laps. Cast iron laps are furnished if parts are of hard materials. This machine gives rotary seal surfaces an ideal type of finish, because it finishes each work part with a positive rotary action.

Catalog #215-I
gives further details

NORTON GRINDERS and Lappers

Abrasives • Grinding Wheels • Grinding and Lapping Machines • Refractories • Porous Mediums • Non-slip Floors • Norbide Products

Lappers

NORTON No. 16FC
Vertical Lapping Machine

This universal lapping machine handles efficiently and economically the wide range of flat and cylindrical work within its capacity. It is a sturdy, dependable producer, the latest in a line of lapping machines which make the attainment of fine accuracy a commonplace accomplishment.

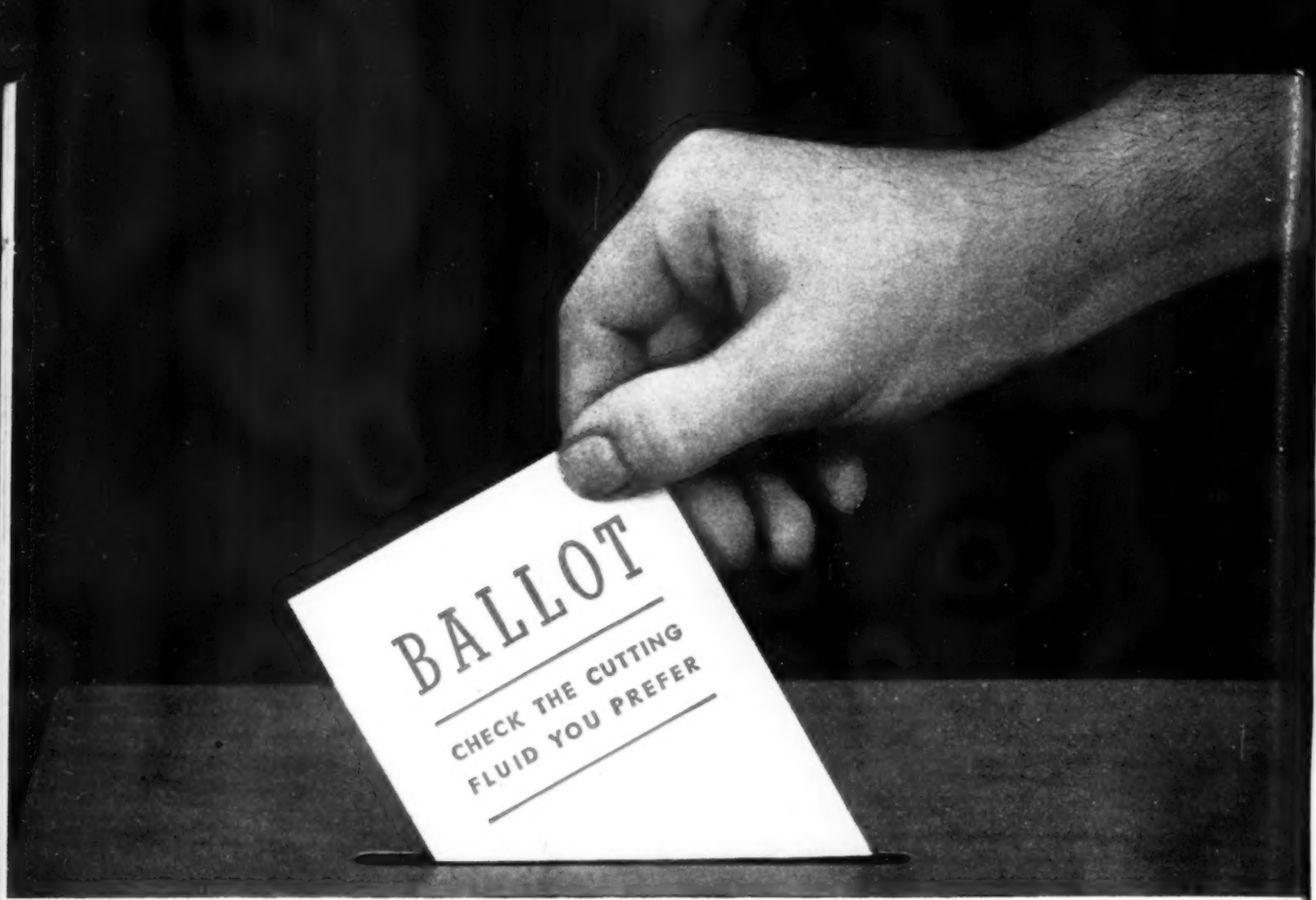
Two outstanding features of the NORTON No. 16FC Vertical Lapping Machine are as follows: **Dual Drive**—two worm drives which are independent but which can be operated in several combinations, give this lapper unusual flexibility. **Variable Speeds**—speed of both the workholder and the laps may be varied to meet specific requirements.

Catalog #212-I
gives further details

M-556

NORTON GRINDERS and Lappers

NORTON COMPANY, WORCESTER 6, MASS. *Distributors in All Principal Cities*



THE RESULT'S "IN THE BAG"

when operators vote!

Yes, Cimcool wins hands down with metal cutting operators. And no wonder! Just look at the platform it runs on (and lives up to).

1 It's clean—doesn't soil hands or clothes.

2 Can't smoke—causes no harmful vapors.

3 Produces no objectionable odors.

4 No slippery film on hands, machine, floor.

5 No chromates or other skin irritants.

6 Is not subject to rancidity.

7 Tools and chips actually stay cool to touch.

OTHER CIMCOOL ADVANTAGES

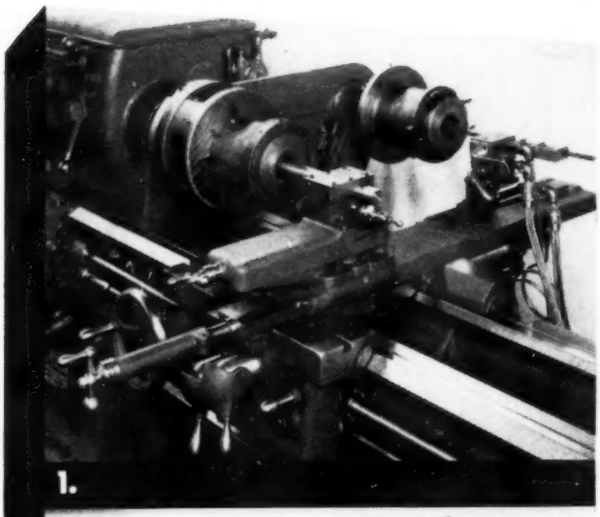
- Cimcool cools faster—allows faster cutting.
- Uniform work temperature increases accuracy.
- No fire hazard—Cimcool can't burn.
- Contains long-lasting rust inhibitor.
- Chemical lubricity increases tool life.
- Covers 85% of all metal working jobs.

CIMCOOL

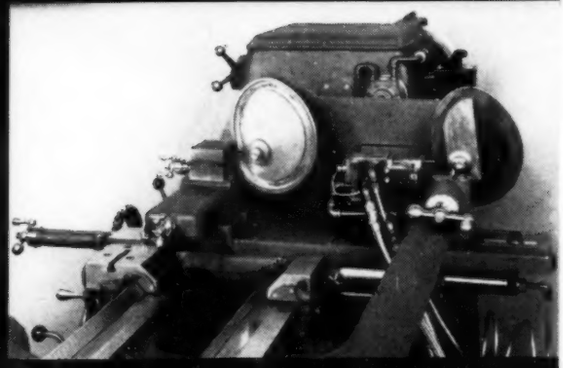
Trade Mark Reg. U. S. Pat. Off.

THE MULTI-PURPOS CUTTING FLUI

CIMCOOL DIVISION of THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U. S. A.



1.



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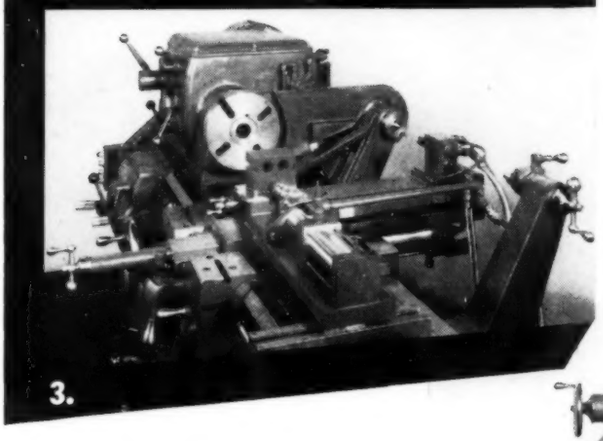


3.

SPRINGFIELD
Profiling Attachment

Here's the hit of the Show—a really versatile Hydraulic Profiling Attachment for Springfield Lathes that will duplicate your difficult jobs from bottle molds to complicated cam forms.

The two units available cover a broad field of duplicating. The turning unit handles either exterior or interior duplicating on work such as bottle molds, rolls, and other jobs where the desired shape is parallel to the center axis. The facing unit is used for press molds, formed facing cutters, and jobs where the duplicating is at right angles to the center axis.

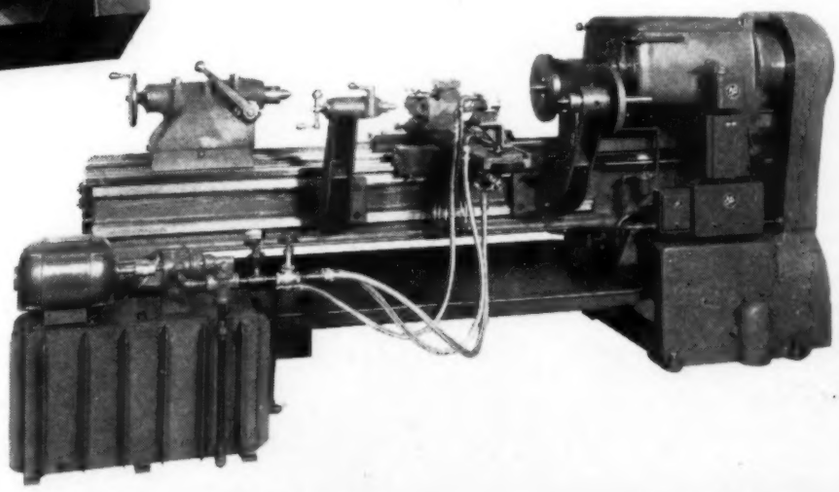
A number of types of masters and templates may be used and may be rotated between centers of the template holding brackets or may be held stationary in template holding fixtures. The template holding brackets utilize the taper attachment ways on the rear of the bed and are accurately aligned with center axis of the lathe to assure extremely accurate results.

The control valve is carried on the rear of the cross slide and the actuating cylinder, mounted on the rear of the carriage, is adjustably attached to the cross slide permitting duplication up to the capacity of the machine. The control valve can be swiveled to accommodate the various conditions encountered on work of this type.

The compact hydraulic power unit is separate and may be located convenient to the machine. Flexible high pressure hose connects the unit with the actuating cylinder and the control valve.

The operator can work from his normal operating position as there are no complicated mechanisms and controls to interfere with efficient operation of the lathe on either duplicating or normal lathe work.

Not only is the machine flexible in adaptability to various profiling operations but can easily and quickly be converted to regular lathe work. Because of this flexibility, it is recommended for all types of lathe work as well as duplicating operations.



1. Illustrating method of duplicating bottle mold from original mold with Turning Unit.

2. Illustrating use of a revolving flat, thin sheet metal template for contour cam turning.

3. Illustrating arrangement of Facing Unit to work at right angles to spindle.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD • OHIO • U.S.A.

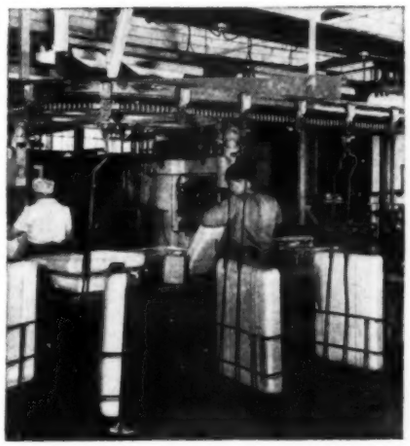
HALLIBURTON'S is mass-produced

HIGHLY-PRIZED ALUMINUM LUGGAGE

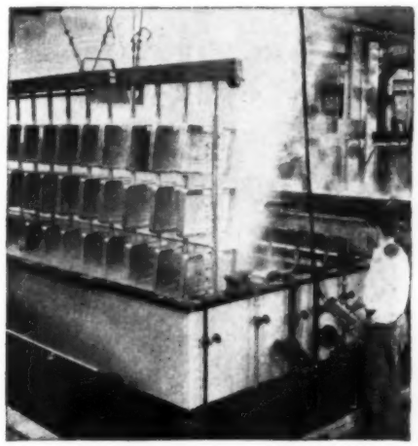
Illustration shows first step in manufacture of Halliburton luggage. Aluminum alloy sheet stock, cut to proper size and lubricated, is drawn almost to full depth and size with a single stroke of the 250-ton Lake Erie Hydraulic Press which has a 40-ton cushion in bed. After cleaning and heat-treating, the shell moves to the second 250-ton Lake Erie Hydraulic Press shown in background where the parallel bands are formed. This operation is performed quickly on the Lake Erie Press before the hardness due to heat-treating sets in. The shells are then trimmed to uniform size and move on to the first assembly station.

with maximum efficiency on LAKE ERIE Hydraulic Presses

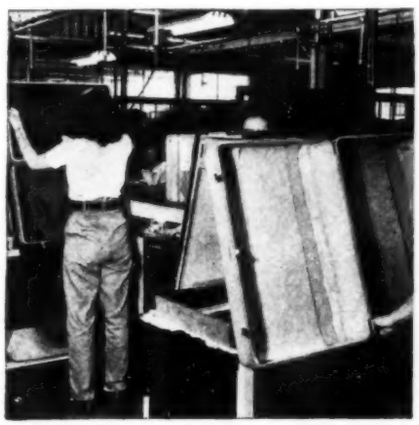
The smart, new lightweight luggage manufactured by Erle P. Halliburton, Inc. of Los Angeles is produced in an ultra-modern factory that incorporates all possible proved aids in mass production. This includes straight line fabrication and assembly, a continuous conveyor system, a variety of multiple unit machines and a pair of 200-ton, high-speed, semi-automatic, push button operated Lake Erie Hydraulic Presses. This installation of Lake Erie Hydraulic Presses provides excellent evidence of the superiority of today's high-speed automatic and semi-automatic hydraulic presses for applications where quantity and quality output are twin requirements. More and more manufacturers are turning to these high-speed hydraulic presses to secure increased volume, higher quality and lower cost production.



1 Spot weld Department where extruded aluminum male and female beads are attached to upper and lower shells. Female bead is later fitted with a live rubber seal.



2 After forming and major assembly, shells are chemically cleaned and then anodized. Illustration shows fixture being lifted from hot bath.



3 Final assembly. Shells have been joined with piano type hinges and have strikers, lock, legs and handle attached. Operators are installing linings and fittings.

4 Completed Halliburton luggage noted for its lightweight, great strength and durability, dust and weatherproof sealed fit, and its extremely attractive appearance.

Write for latest bulletin illustrating and describing Lake Erie Hydraulic Presses —new high speed automatic and semi-automatic models of all sizes and types designed to increase your production, improve the quality of your products and decrease their costs.

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.
MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY
General Offices and Plant:
507 Woodward Avenue, Buffalo 17, New York

★

FELLER ENGINEERING DIVISION
SPECIALISTS—EXTRUSION AND
FORGING PRESSES
1100 Empire Building, Pittsburgh 22, Pennsylvania

OFFICES IN PRINCIPAL CITIES AND FOREIGN COUNTRIES

A BUYING GUIDE FOR ABRASIVES

POINT No. 12

Simplification and Standardization

Through an extensive program, The Carborundum Company is making selection and application of the best abrasives to use for specific jobs simpler and more efficient. Series 20 is a timely example. In a relatively narrow pattern of grits and grades, these wheels cover a wide range of grinding operations. The smaller number and variety of wheels that need be stocked is only one of several important benefits realized.

Easier to specify and order, products by CARBORUNDUM, repackaged and relabelled for fast identification, explain another reason for their growing preference by users of abrasive products. The Carborundum Company, Niagara Falls, New York.

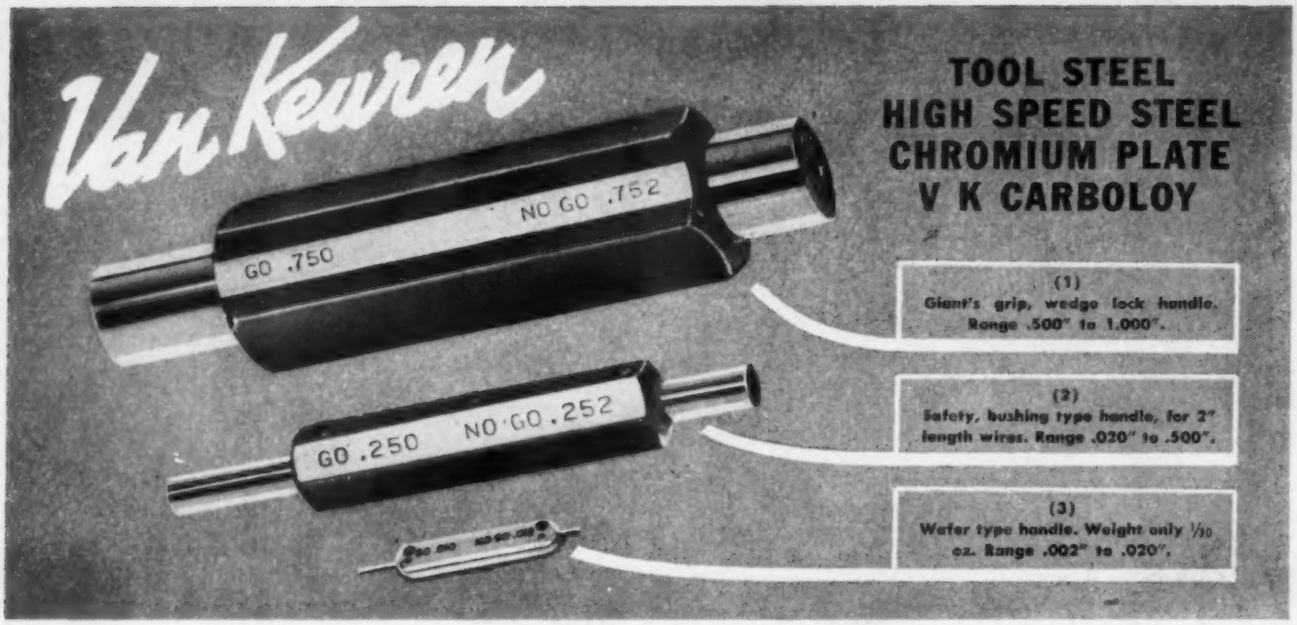
CARBORUNDUM

A Good Rule for Good Grinding

Specialized wheels by CARBORUNDUM for thread grinding.
Cutting-off wheels . . . the modern tool for faster, less costly, more finished cuts.
Cool-cutting green grit wheels for cemented carbide.
Diamond wheels to meet stiffer technical needs.
A coated abrasive for every sanding and finishing condition.
All standard shapes are supplied in grinding wheels by CARBORUNDUM

. . . CALL IN **CARBORUNDUM** TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS



WIRE TYPE PLUG GAGES

have extra value

FULL 1 7/8" AND 2" LENGTH GAGING UNITS . . .
ALWAYS ACCURATE . . .
EXPERTLY ENGINEERED . . .
LONG LIFE LIGHT ALUMINUM HANDLES . . .
PROMPT DELIVERY FROM A
A STOCK OF 2 MILLION WIRES . . .

For Super Service . . . Phone Watertown 4394

Wire type plug gages were originated by The Van Keuren Co. in 1925. They have resulted in gigantic economies for American Industry and have been widely imitated.

Only in Van Keuren Wire Type Plug Gages is the maximum value of the gage dollar fully realized. The light aluminum handles are especially designed for utility, holding power and long life. The full length gaging units have a uniform high hardness, exceptional finish, long wearing qualities and superlative accuracy.

You do not need to inspect Van Keuren Plug Gages. Our double inspection at the factory takes care of that expense for you. There is no time lost in waiting for replacements.

Van Keuren prompt deliveries will enable you to cut your gage inventory to a minimum.

On your next order specify VK Wire Type Plug Gages; VK Carboloy for long runs because of the enormous saving in cost per hole gaged . . . VK Carboloy for fussy jobs because of the infinitesimal gage wear and insurance that all the parts will be within specified limits. VK Tool Steel . . . VK High Speed Steel . . . Precision Chromium Plate for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

TOOL ROOM SET NO. 80
Drill sizes from 1 to 80
(.228" to .0125").
Price $425.00

WRITE FOR YOUR COPY

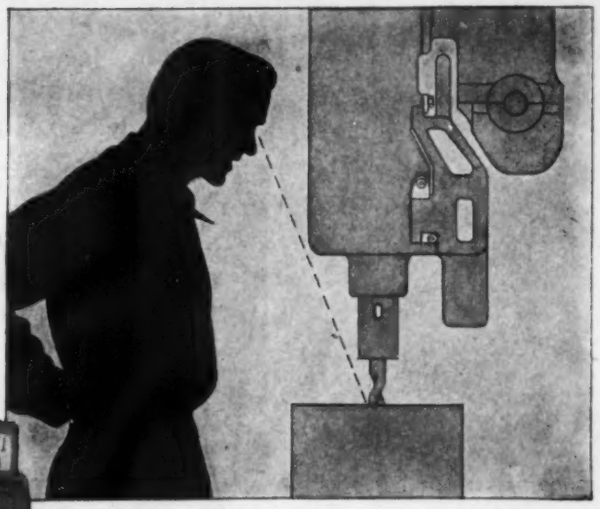
of the 1948 VK Catalog and Handbook. Its 208 pages contain complete information and prices on Van Keuren precision gages and instruments and valuable new engineering formulas and tables.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Powerful-



With the arm low or high, the operator always sees the work. Note the very slight projection of the Cincinnati Bickford head beyond the spindle.

Safe-Versatile-

Very powerful—very rigid—and yet extremely easy to handle.

All controls on the head low and close to the operator's hands, saving physical effort and giving the operator a clear view of the work on all jobs.

Outstanding safety features include Safety Elevating Nut, Spindle Catch, Power Rapid Traverse Safety, Feed Safety Clamping and Elevating Safety Interlock.

36 speeds and 18 feeds (4 speed ranges are optional) give a wide range of performance and versatility.

You may expect a sustained quality of work and fine production from these machines.

THE CINCINNATI BICKFORD TOOL CO.

RADIAL AND UPRIGHT DRILLING MACHINES

SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

Write for Bulletin R-29, and check the outstanding design and construction features.

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9. Ohio U.S.A.

Yes Sir, . . . here's

UNITED STATES

alloy steel in *ANY form your heart desires!*

...and in ANY analysis...in ANY heat treatment ...in ANY size...and to HIGHEST quality standards

THAT seems like a pretty big order. But we are prepared to fill it. Because we are completely equipped to meet ALL your alloy steel requirements.

• If you need forging ingots, blooms, billets or slabs . . . square bars, round bars, coiled bars, spring flats or special sections . . . plates, sheet, strip, sketch plates or structural shapes—

• If you use bearing steels, aircraft steels, gear steels . . . Nitralloy steels . . . regular or special analysis alloys—

• If the steel must be quenched and tempered . . . regular or spheroidized annealed . . . normalized . . . stress relieved or tempered . . . or needs other special heat treatments—

• If you want it hot rolled . . . in straight lengths or coiled . . . machine or gag straightened . . . flattened . . . machine, cracker or torch cut . . . pickled . . . sand blasted, oiled or limed—

Whatever your specifications call for—we can provide.

• • •

Complete alloy steel producing and finishing facilities, both in Pittsburgh and Chicago, make it possible to expedite deliveries—to reduce shipping time and cost—to give you not only the finest alloy steel produced, but exactly as you want it, no matter where you are located.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

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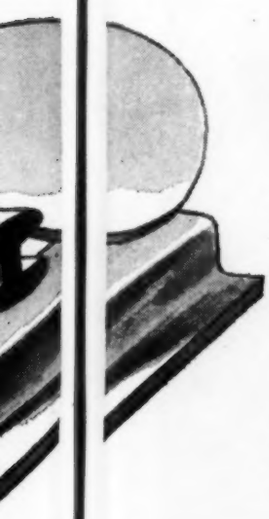


Did you know?

...That no other single producer can offer, or equal, Carnegie-Illinois Steel Corporation's versatility ***of alloy steel production.***

...That much of the major contribution Carnegie-Illinois was able to make in the development of the National Emergency Steels was based on the valuable research previously done in our laboratories—notably in the field of hardenability.

...That Carnegie-Illinois added new electric furnace plants in both Pittsburgh and Chicago districts to produce qualities suitable for aircraft engine parts as well as large quantities of bars for aircraft tubing and antifriction bearings.

U·S·S Carilloy Steels

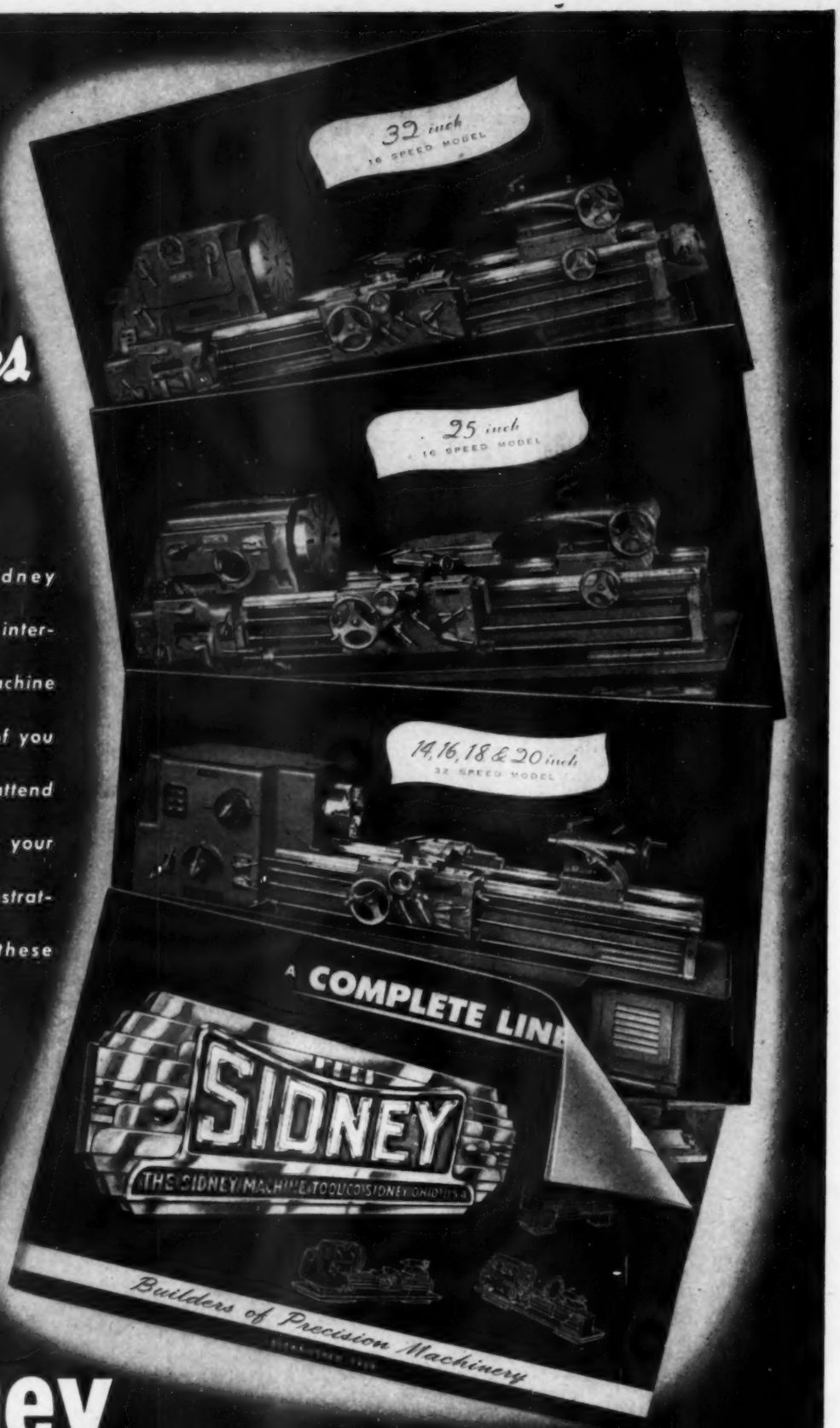
USS STEEL

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

S T E E L

Sidney Lathes



This new line of Sidney lathes created much interest at the recent machine tool show. For those of you who were unable to attend that exhibit, write for your copy of the bulletin illustrating and describing these outstanding machines.

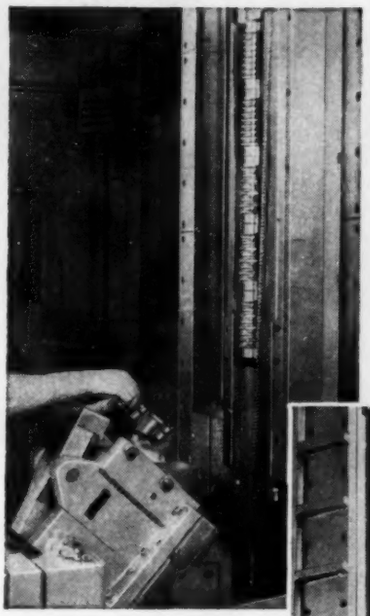
Sidney
MACHINE TOOL COMPANY
SIDNEY, OHIO

Builders of Precision Machinery Since 1904

BEARING CAP SETS BROACHED EN BLOC

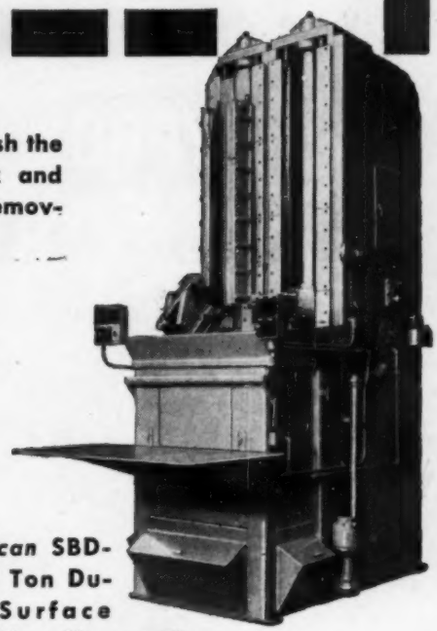
This *American* Duplex Surface Broaching Machine is tooled up to broach automotive main bearing caps, producing complete sets for 100 motors per hour.

When you are planning metal shaping or finishing work, make use of *American's* complete broaching service—machines, tools, and engineering. You are under no obligation when you SEE *American* FIRST!

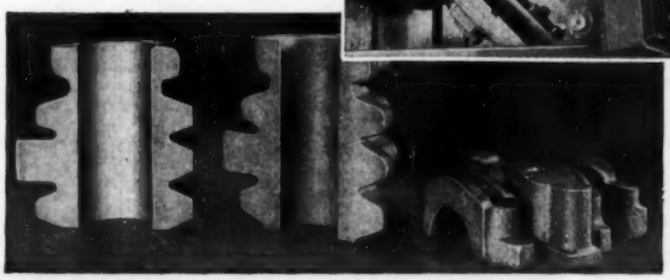


Operation at the left is to finish the joint face and bearing lock and semi-finish the half round, removing ⅛ stock on each surface.

Operation at right straddle broaches the two ends of the casting.



***American* SBD-66-25 Ton Duplex Surface Broaching Machine with tilting type work tables.**



Above: Right to left: 1. The rough casting. 2. Ends straddle broached. 3. Joint face, bearing lock and half round broached.

FOR *ALL* YOUR BROACHING NEEDS—
SEE AMERICAN FIRST

American
BROACH AND MACHINE CO.

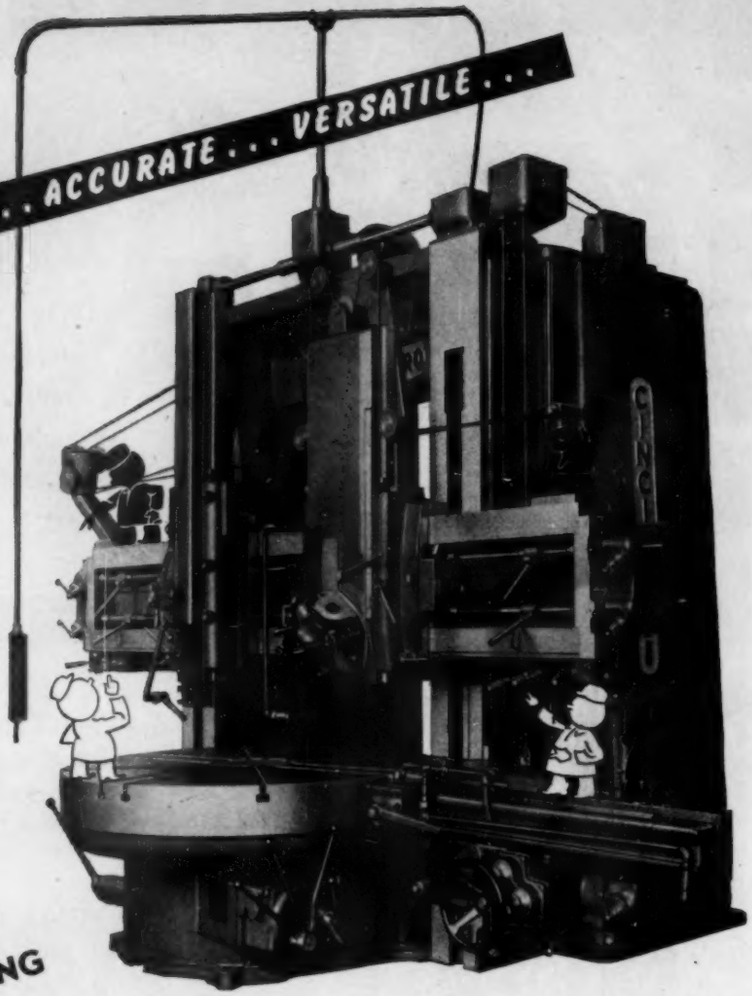
ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

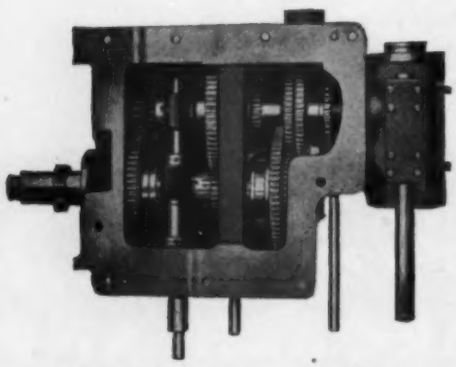
DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

IT'S FAST . . . ACCURATE . . . VERSATILE . . .



The NEW and IMPROVED CINCINNATI HYPRO Boring Mill

FEATURING INDEPENDENT FEED, RAPID TRAVERSE AND REVERSING MECHANISM FOR EACH HEAD



Hypro Anti-Friction Power Feed and Traverse Box

An individual unit is provided for each Head and contains the complete power feed, rapid traverse, reversing mechanism and safety clutches.

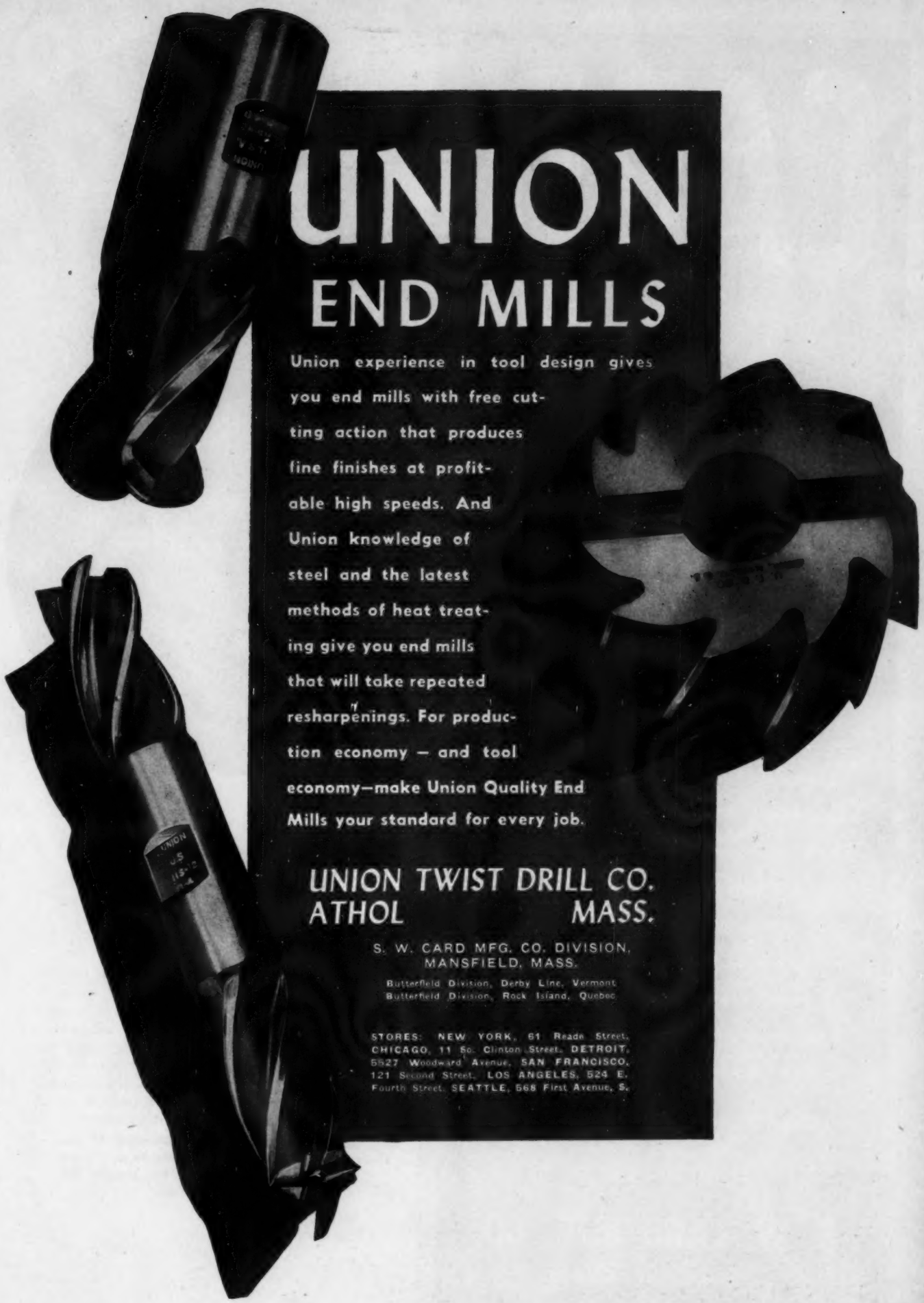
All levers for feed, traverse and reverse are placed in front of the machine convenient to operator's working position.

Each box contains hardened alloy steel gearing mounted on multiple splined shafts and anti-friction bearings. Complete unit is enclosed and runs in a bath of oil supplied by a pump incorporated in the box.

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO


UNION
END MILLS
Union experience in tool design gives you end mills with free cutting action that produces fine finishes at profitable high speeds. And Union knowledge of steel and the latest methods of heat treating give you end mills that will take repeated resharpenings. For production economy — and tool economy—make Union Quality End Mills your standard for every job.
UNION TWIST DRILL CO.
ATHOL MASS.
S. W. CARD MFG. CO. DIVISION, MANSFIELD, MASS.
Butterfield Division, Derby Line, Vermont
Butterfield Division, Rock Island, Quebec
STORES: NEW YORK, 61 Reade Street, CHICAGO, 11 So. Clinton Street, DETROIT, 5527 Woodward Avenue, SAN FRANCISCO, 121 Second Street, LOS ANGELES, 524 E. Fourth Street, SEATTLE, 568 First Avenue, S.

CARD

Round DIES

Produced of hardened tool steel, designed to be readily and accurately adjustable by means of a simple taper screw, built to retain their size when removed from the holder — Card Adjustable Round Split Dies are available in all standard thread sizes and forms. On both hand and screw machine work they will produce long runs of threads profitably and accurately, with a minimum of lost time for adjustment and resharpening.

Union . . . Butterfield . . . S. W. Card
Divisions of the
Union Twist Drill Co.

S. W. CARD MFG. CO.
Mansfield, Mass.

STORES

New York: 61 Reade St.; Chicago: 11 So. Clinton St.; Detroit: 5527 Woodward Ave.; Los Angeles: 524 E. Fourth St.; Seattle: 568 First Ave., South.

Butterfield TAPS

RIGHT FOR THE JOB!

RIGHT ON THE JOB!

You can select the right tap for every job from the complete Butterfield line . . . and know that it will be right on the job . . . that it will produce the extra long runs of accurate threads that mean profits on quantity production . . . that it will take repeated resharpenings without losing its free-cutting, fast-cutting characteristics. Each Butterfield Tap is right on the job, because it has been made right for the job.

Union . . . Butterfield . . . S. W. Card
Divisions of the
Union Twist Drill Co.

BUTTERFIELD DIVISION

Derby Line, Vt.
Rock Island, Que.

STORES: New York, 61 Reade St.—Chicago, 11 So. Clinton St.—Cleveland, Hal W. Reynolds, 3346 Superior Ave.—Detroit, 5527 Woodward Ave.—Los Angeles, 524 E. Fourth St.—Toledo, 3636 Detroit Ave.—Toronto, 137 Wellington St., West—Montreal, 111 St. Paul St. West—Winnipeg 212 Bannatyne Ave.—Vancouver, 119 Pender St., W. Agents for Great Britain: Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington London S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.

Precipitron* TRAPS HIGH COSTS

Precipitron traps the precision-damaging dirt that escapes other methods

With production costs skyrocketing, every bit of spoilage, maintenance expense and employees' time that can be saved is money in the treasury. To prevent the costly rejects caused by destructive air-borne particles, Precipitron employs a principle of electrostatic air cleaning that *gives three to five times the efficiency of ordinary mechanical air filters.* That's why plants which manufacture or assemble highly finished precision parts are so enthusiastic about Westinghouse Precipitron.

They have learned that conventional air cleaning and air conditioning are not enough. Over 150 major plants producing precision parts have already installed Precipitron to cut production costs.

Precipitron removes up to 90% of all microscopic particles of floating dust, smoke, soot, abrasives, fumes—"invisible dirt" particles as tiny as 1/250,000th of an inch. Operation is simple and silent. And—operating costs are low.

If you are interested in increasing the efficiency of your close-tolerance operations, call your nearest Westinghouse office. Or write to: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

*Trade Mark of the Westinghouse Electric Corporation
Sturtevant Division, Reg. U. S. Pat. Off.

AS WELL AS AIR-BORNE DIRT

Precision Parts, Instruments

Precipitron clears the air of abrasive and corrosive particles that cause irreparable damage to close-tolerance machining, and inaccuracies in superfinish surfaces. Improves employee morale.

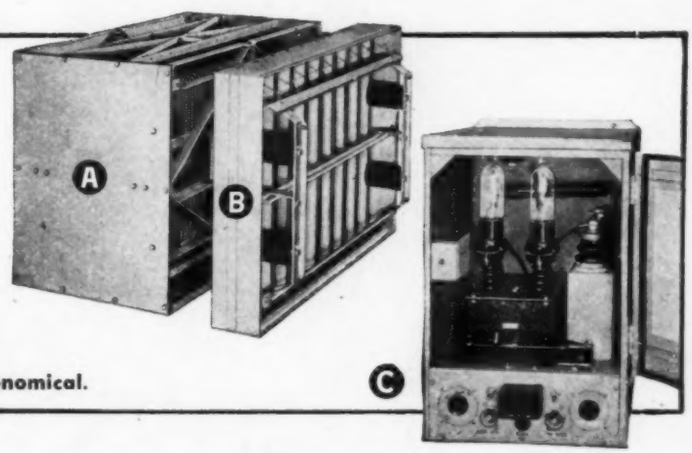
Auto and Aircraft Engines

Precipitron protects superfinished surfaces of anti-friction bearings, engine and other precision parts. Precipitron-cleaned air can be recirculated—will effect savings in plant heating or cooling costs.

Precipitron® HAS ONLY THREE MAJOR PARTS

- Ⓐ *THE DUST COLLECTOR*
- Ⓑ *THE IONIZER*
- Ⓒ *THE POWER PACK*

Precipitron is an extremely simple electrostatic air cleaner having no moving parts to get out of order. Its operation is highly efficient and economical.



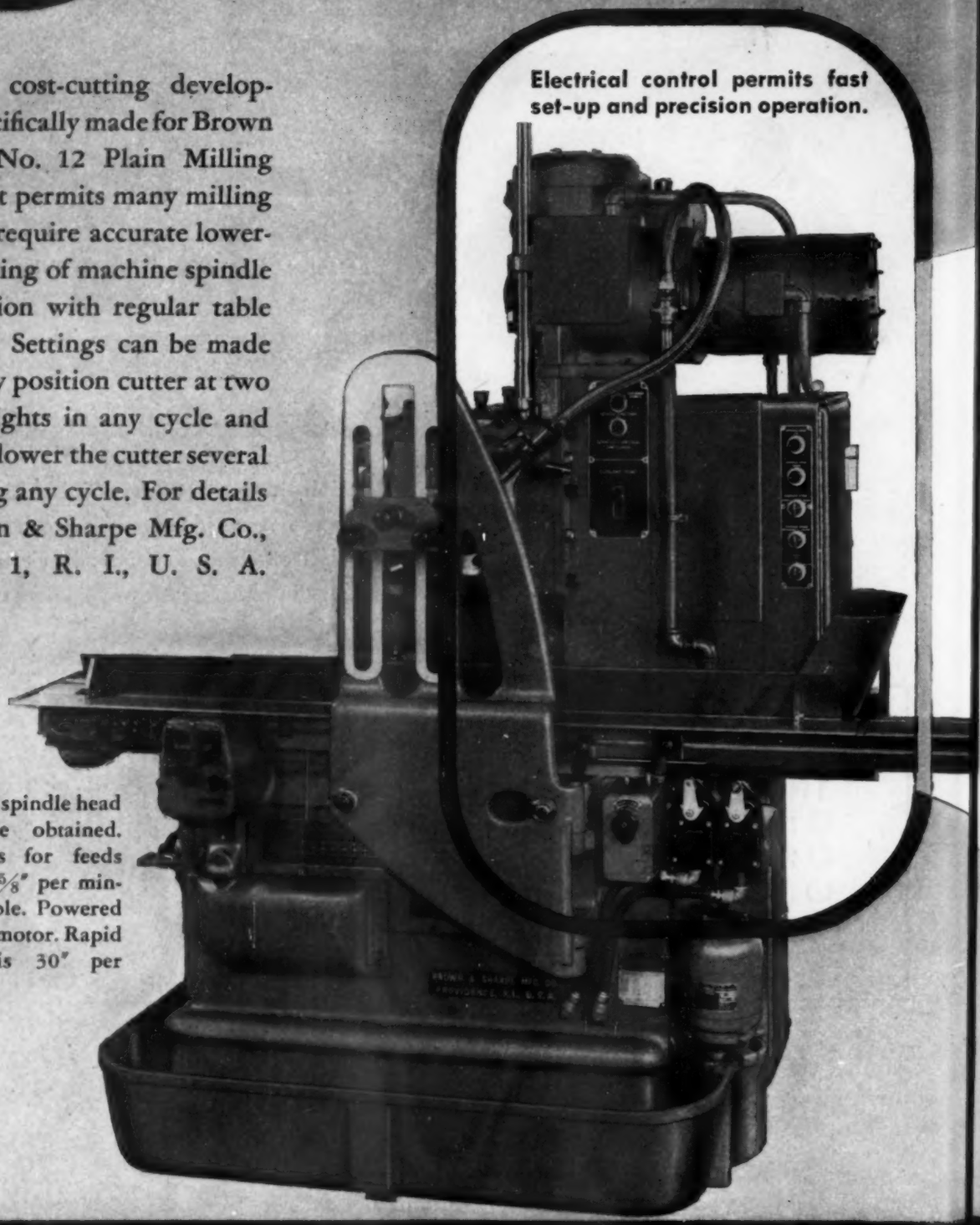
Westinghouse Sturtevant DIVISION

J-80012

NEW Spindle Power Feed

FOR NO. 12 PLAIN MILLING MACHINES

THIS NEW cost-cutting development is specifically made for Brown & Sharpe No. 12 Plain Milling Machines. It permits many milling cycles that require accurate lowering and raising of machine spindle in conjunction with regular table movements. Settings can be made to accurately position cutter at two different heights in any cycle and to raise and lower the cutter several times during any cycle. For details write Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



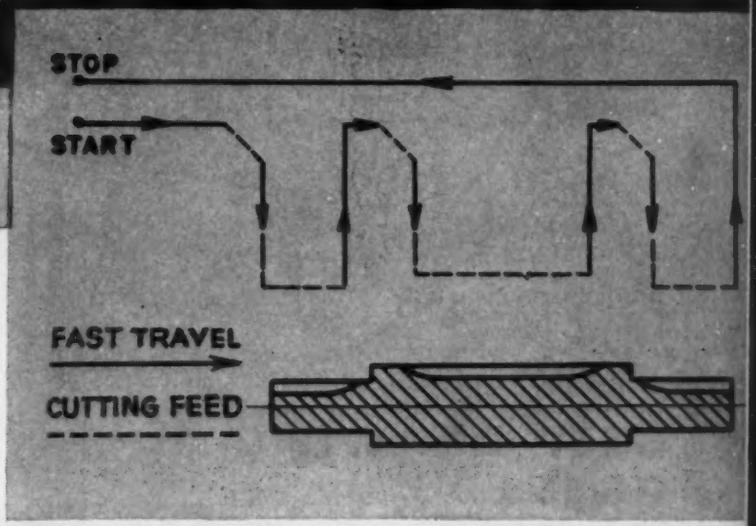
Electrical control permits fast set-up and precision operation.

Wide range of spindle head feeds can be obtained. Pick-off gears for feeds from ½" to 7⅝" per minute are available. Powered by brake-type motor. Rapid travel rate is 30" per minute.

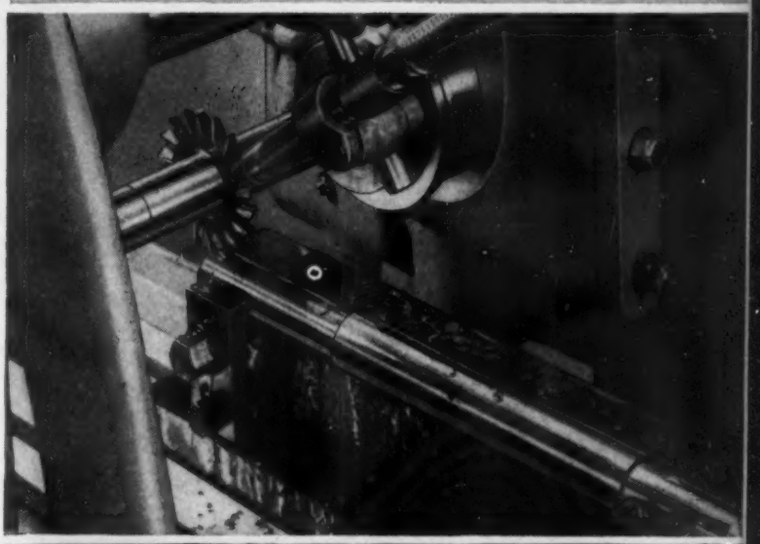
BROWN &

d . gives more work, with fewer set-ups

ES

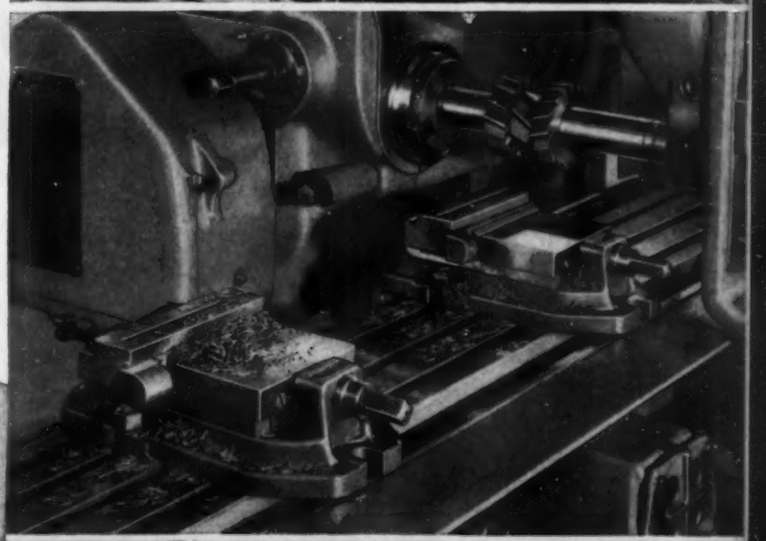


THE DIAGRAM at right shows one of many cycles made available by this new device. Horizontal arrows are for table direction, vertical arrows for spindle head direction, and the type of job is shown beneath the cycle. Cycles can be made with machine table starting in either direction. For information about a cycle that may simplify your milling, consult our Milling Engineering Service.



MILLING THREE KEYWAYS, as shown at the right, requires that the cutter operate at two different heights above the machine table. This operation is done automatically with the Spindle Power Feed Mechanism using cycle shown above.

CLIMB MILLING AT BOTH ENDS of table, *with the same cutters*, is made possible with this double fixture set-up. It is a continuous cycle with the spindle head power feed being used to raise the cutters to clear the work which has just been loaded in the second fixture. Climb milling makes possible increased feeds and longer cutter life. Often permits efficient milling of pieces difficult to hold.



SHARPE B·S

BIRDSBORO HYDRAULIC

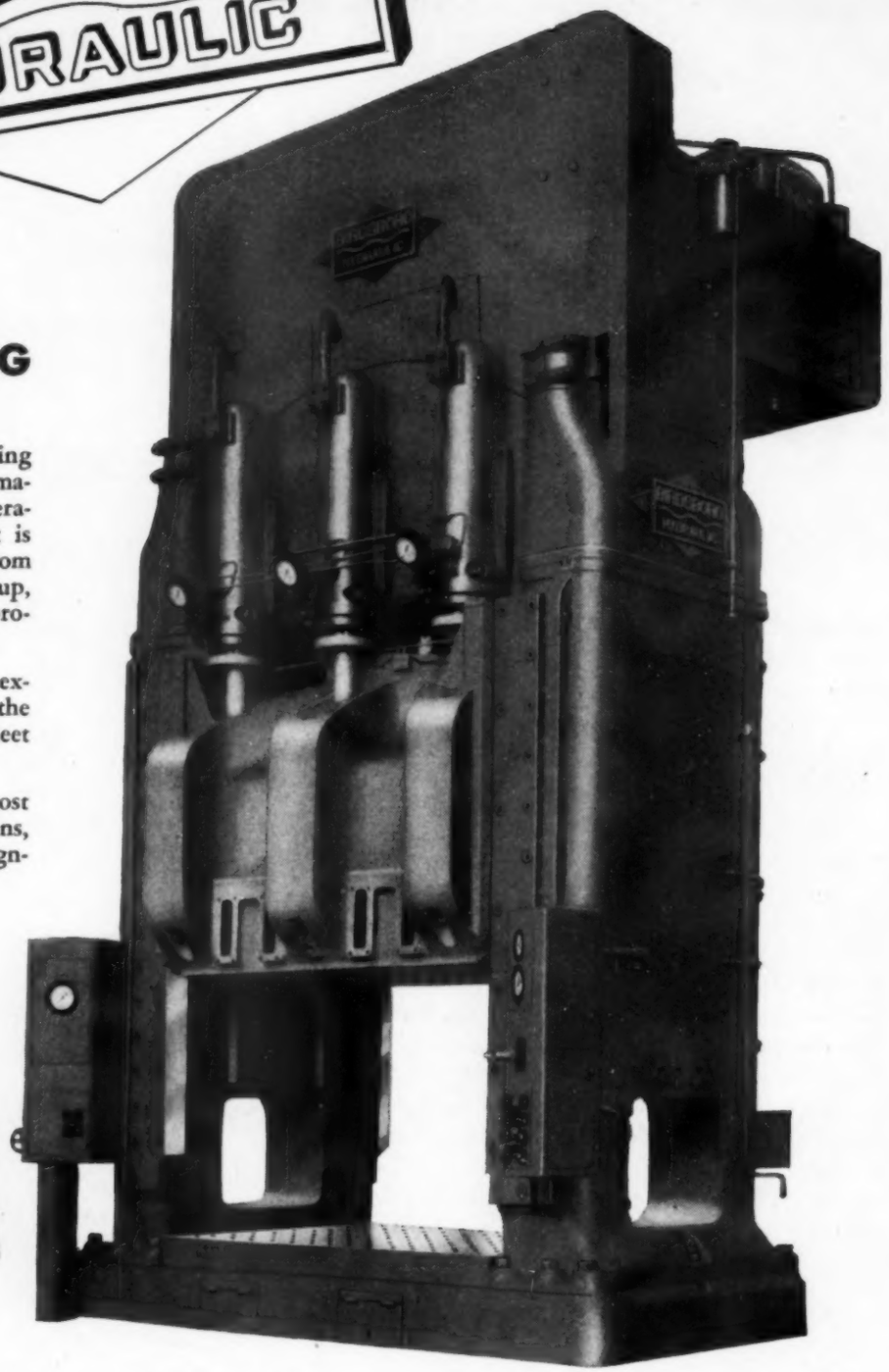
New

DEEP DRAWING PRESS

In this new hydraulic deep drawing press Birdsboro offers a *universal* machine which permits economical operation with large and small dies. It is designed for quick change over from single action to double action set-up, quick changing of dies and high production capacity.

The most outstanding feature is its extreme flexibility for adapting it to the different operations involved in sheet metal drawing.

If you're looking for fast, low cost production of large metal sections, take advantage of Birdsboro's design-engineering facilities today.



750-ton Triple Action Hydraulic **DEEP DRAWING PRESS** with bolster area 96" from right to left and 68" from front to back

MP 2-47

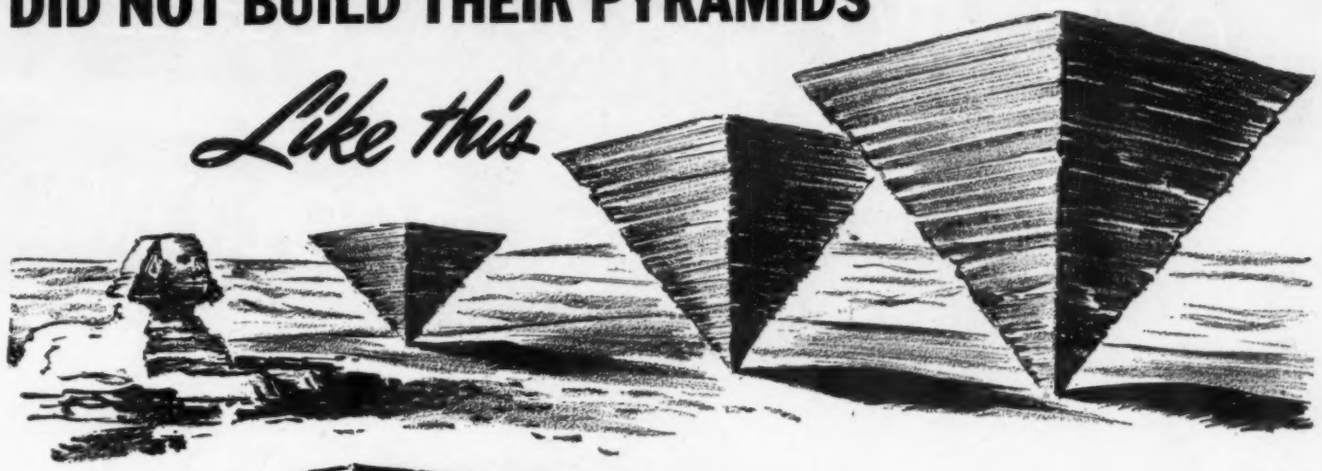
Birdsboro Steel Foundry & Machine Co. • Birdsboro, Pa.

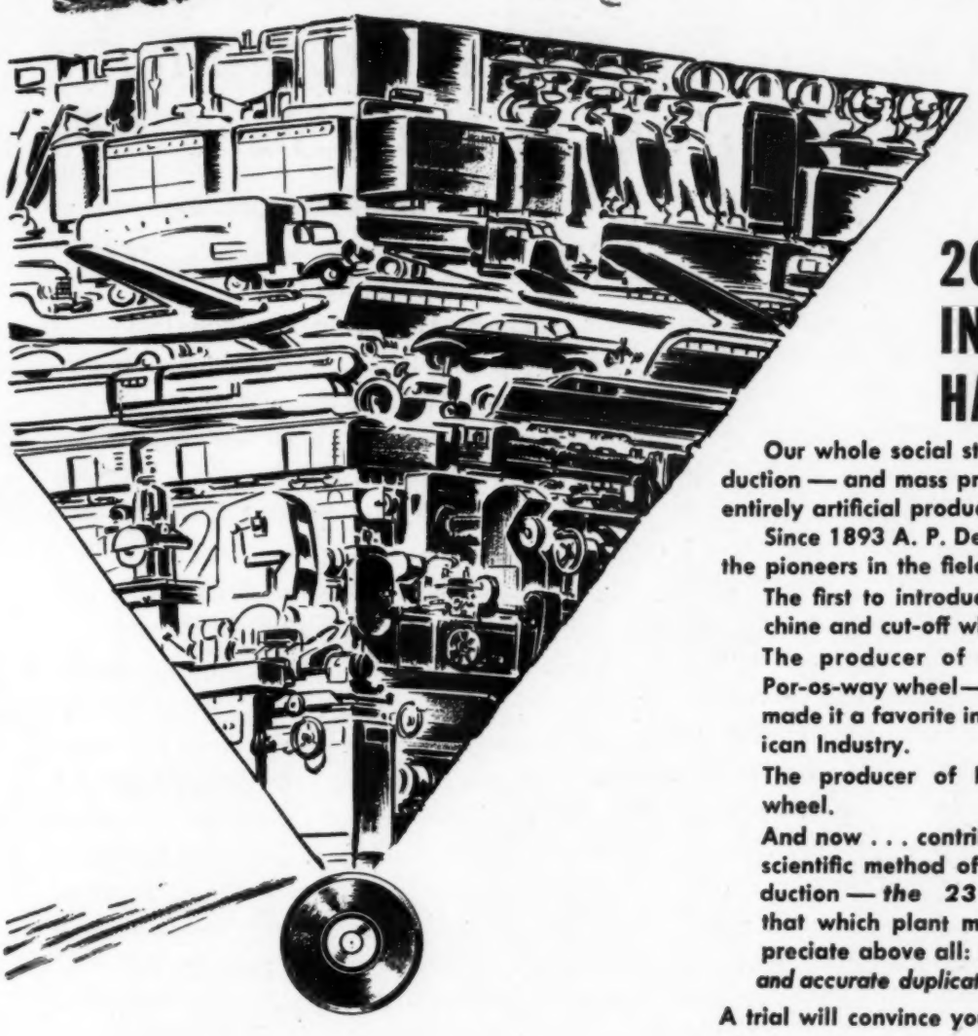
BIRDSBORO HYDRAULIC PRESSES

BUILDERS OF: Hydraulic Presses
Steel Mill Equipment • Rolls
Special Machinery • Crushing Machinery

THE KINGS OF EGYPT
DID NOT BUILD THEIR PYRAMIDS

Like this





But

20TH CENTURY INDUSTRY HAS DONE IT··

Our whole social structure is based on mass production — and mass production is dependent on one entirely artificial product of man: the grinding wheel.

Since 1893 A. P. DeSanno & Son has been one of the pioneers in the field of grinding.

The first to introduce the high speed cut-off machine and cut-off wheel.

The producer of the internationally known Por-os-way wheel — outstanding performance has made it a favorite in precision operations in American Industry.

The producer of Paraflex, the flexible rubber wheel.

And now . . . contributing a highly perfected and scientific method of vitrified grinding wheel production — ***the 23 process*** — which provides that which plant managers, engineers, etc., appreciate above all: *high performance and constant and accurate duplication.*

A trial will convince you!

A. P. de Sanno & Son, Inc. PHOENIXVILLE, PENNA.

OUT TO BREAK SPEED PLUS ECONOMY

The New BULLARD Type "K" Mult-Au-Matics Set the Pace for Small and Medium Sized Jobs

Long a vital factor in stepping up mass production — and lowering its cost — the BULLARD Mult-Au-Matic principle reaches its latest development in the new Type "K". This new machine brings greatly increased spindle speeds and the economies of quicker indexing time to small and medium sized jobs of cast iron, steel and light metal alloys such as aluminum and magnesium. New improvements include:

1. Higher Spindle Speeds

The Type "K" Mult-Au-Matic is offered with 6, 8, 12 or 16 spindles, with 41 speed changes, 82 rates of feed, selective feeds and common speeds at all stations. And — particularly important in getting maximum capacity with carbide cutting tools — spindle speeds have been increased up to 900 rpm . . . ***three times the speed ever before available.***

2. Less Time for Index Cycle

The already brief time between cuts is further reduced by a new index cycle control, with several new developments. Opening the chucks at the loading station is part of the index cycle. Chucks are automatically opened at the loading station, and closed by stepping on a foot treadle which also releases index when the last operating head returns to "neutral".

3. Twin Spindle Application

On small jobs, twin spindles produce two pieces for every machine index cycle, or double the production. However, on some jobs where the advantages of greater spindle speeds and a faster index cycle are required, the Type "K" Mult-Au-Matic is available with single spindles at each station.

More Speed . . . Higher Production
More Accuracy . . . Higher Efficiency

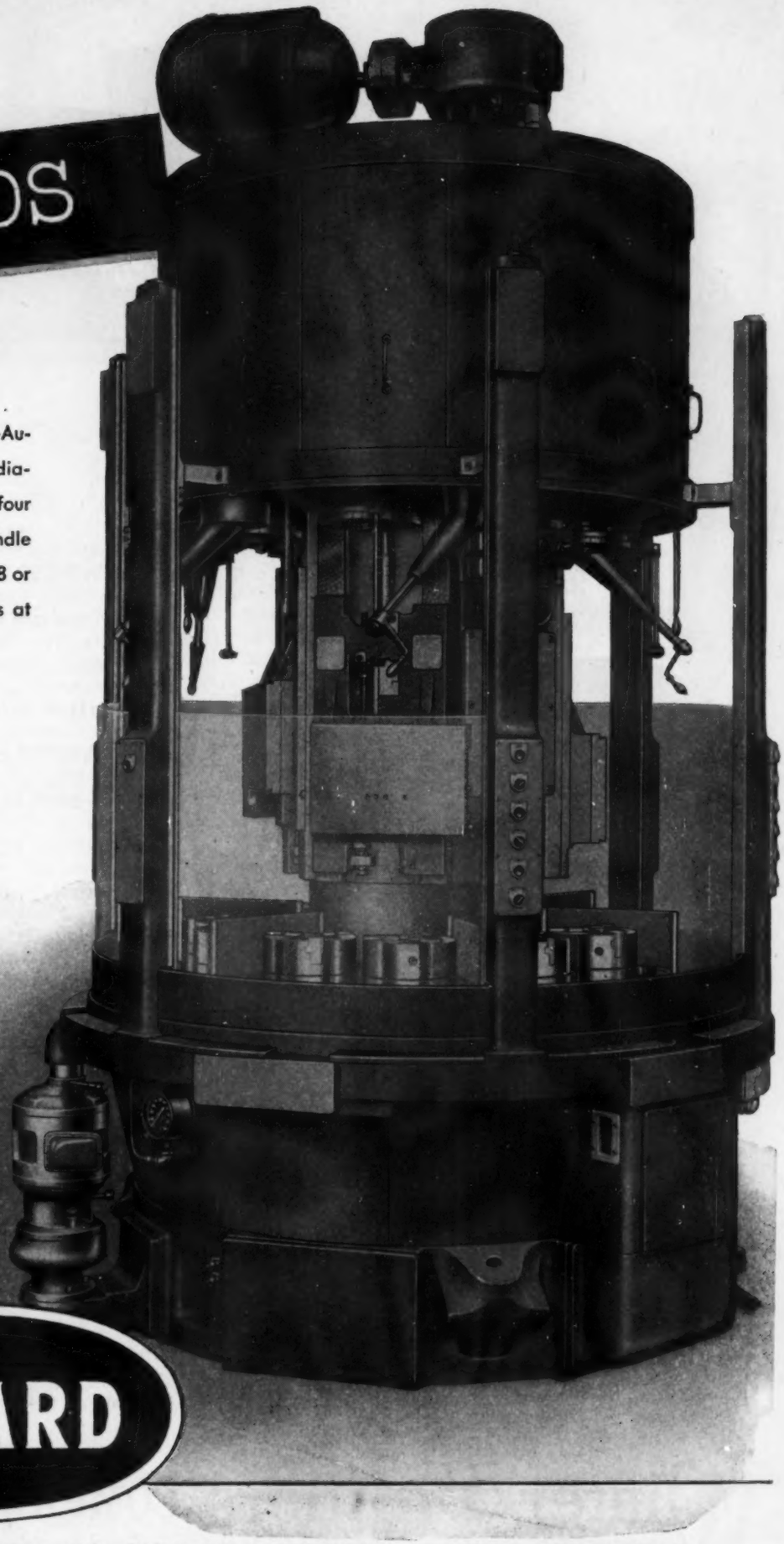
To take the strain of continuous top speeds, the Type "K" Mult-Au-Matics are massively built for extreme rigidity, accuracy of alignment and maximum vibration absorption. By the incorporation of spindle gear synchronizers, clashing of gears has been eliminated — and gear life greatly prolonged.

Climaxing over 30 years of development of BULLARD'S world-famous Mult-Au-Matic method of machine tool operations, the new Type "K" offers many more advantages worth investigating for your own production . . . Write for detailed information. The BULLARD COMPANY, Bridgeport 2, Connecticut.

BULLARD CREATES *NEW METHODS*

RECORDS

The BULLARD Type "K" Mult-Au-Matics, for work up to 10" in diameter, are available in four models: 6 or 12 spindles with spindle speeds at 100 to 900 rpm, and 8 or 16 spindles with spindle speeds at 98 to 883 rpm.



BULLARD

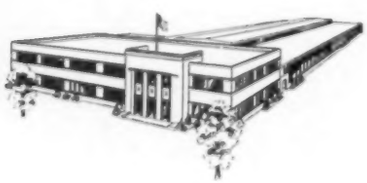
TO MAKE MACHINES DO MORE

WINTER *Commercial Ground* TAPS

Leadership BUILDS ON *Craftsmanship*

WINTER Commercial Ground Thread Taps are the ideal choice for accuracy and economy. They are form ground after hardening by an exclusive WINTER process, and will work freely—even on tough materials. For faster, easier tapping to reasonably close limits, with less strain on tool and work, specify WINTER Commercial Ground Thread Taps.

Craftsmanship of the highest order always has been employed in the manufacture of WINTER Taps.



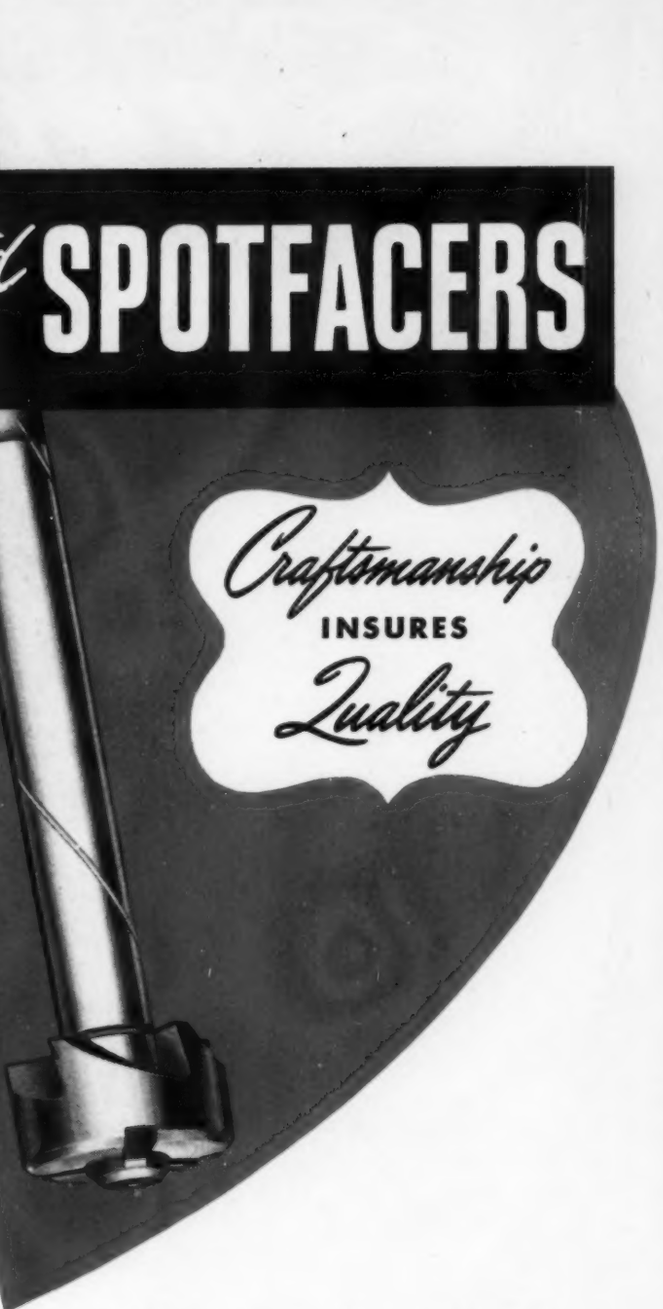
Always at Your Service

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

Winter Brothers COMPANY

ROCHESTER, MICH. and WRENTHAM, MASS. • Distributors in Principal Cities
A Division of the National Twist Drill and Tool Company • Branch Stores: San Francisco, Chicago, Detroit

NATIONAL *Inverted* SPOTFACERS



Craftsmanship INSURES *Quality*

NATIONAL Spline-Drive Inverted Spotfacers combine ruggedness, positive driving and accurate alignment with long life and easy assembly. The drive is accomplished through splines that are part of the pilot, bearing against slots in the cutter. The cutter is retained by solid shoulders on the pilot. Removal is simple; just turn cutter backwards on the pilot and slide off. Spline-Drive Inverted Spotfacers are part of NATIONAL'S complete line of Rotary Metal Cutting Tools.

Call Your Distributor

LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL Cutting Tools. Call them for cutting tools or any other staple industrial product.

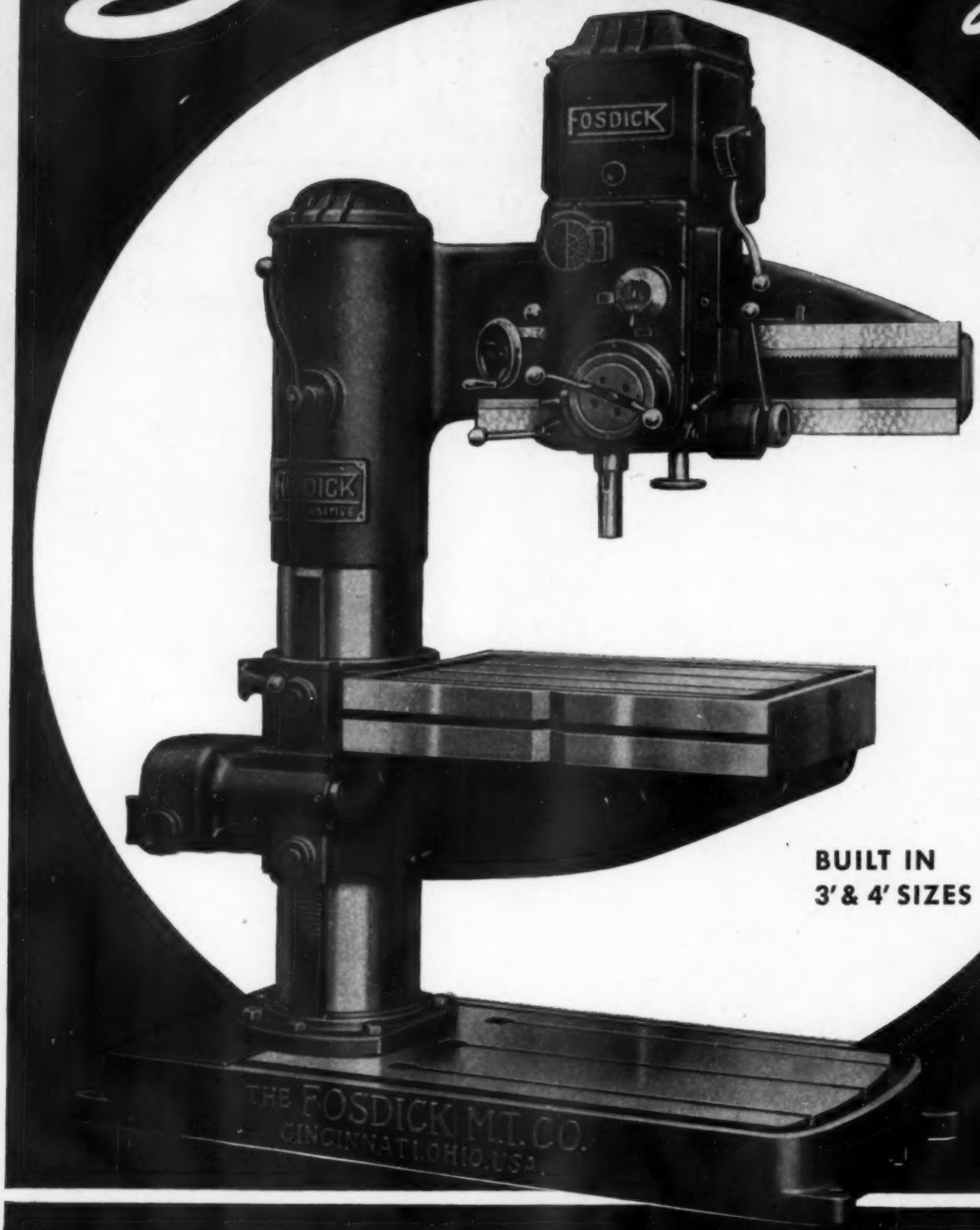
The skill and facilities to make NATIONAL Tools the best you can buy are supplied at NATIONAL'S great new plant in Rochester, Michigan.

NATIONAL TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICHIGAN, U. S. A. Tap and Die Division — Winter Bros. Co.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

Something



BUILT IN 3' & 4' SIZES

THE Fosdick MACHINE TOOL COMPANY
CINCINNATI 23, OHIO

new in Radials

FOSDICK *Sensitive* RADIALS

● This new Fosdick Sensitive was shown for the first time at the Machine Tool Show in Chicago. Recognition of its wide range adaptability was instantaneous.

Different—Sturdy—Flexible it departs from the conventional radial design in that this Fosdick Sensitive Radial has a fixed arm and a moveable table which can be moved up and down the column. Thus, the table may be located in the proper position for any job suitable for this machine. Also both the arm and table can be swung in a 360° arc. Table may be raised or lowered either by power or by hand.

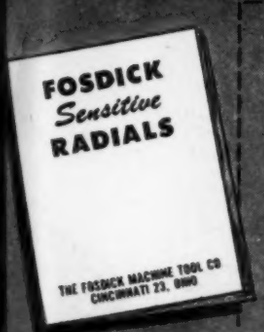
For the first time you now have available a high speed sensitive drill plus all the advantages of a Radial.

For work too high to be placed on the table you merely swing the table to the rear of the column and mount the work on the base.

All controls are within easy reach of the operator in this normal working position.

Complete description of the new sensitive radial is available in this new bulletin. Construction features—capacities—and complete specifications are fully covered in the Fosdick Sensitive Radial Bulletin S.R.A.

WRITE FOR THIS BULLETIN



THE FOSDICK MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

Please send me your new Sensitive Radial Bulletin S. R. A.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE NO. _____ STATE _____

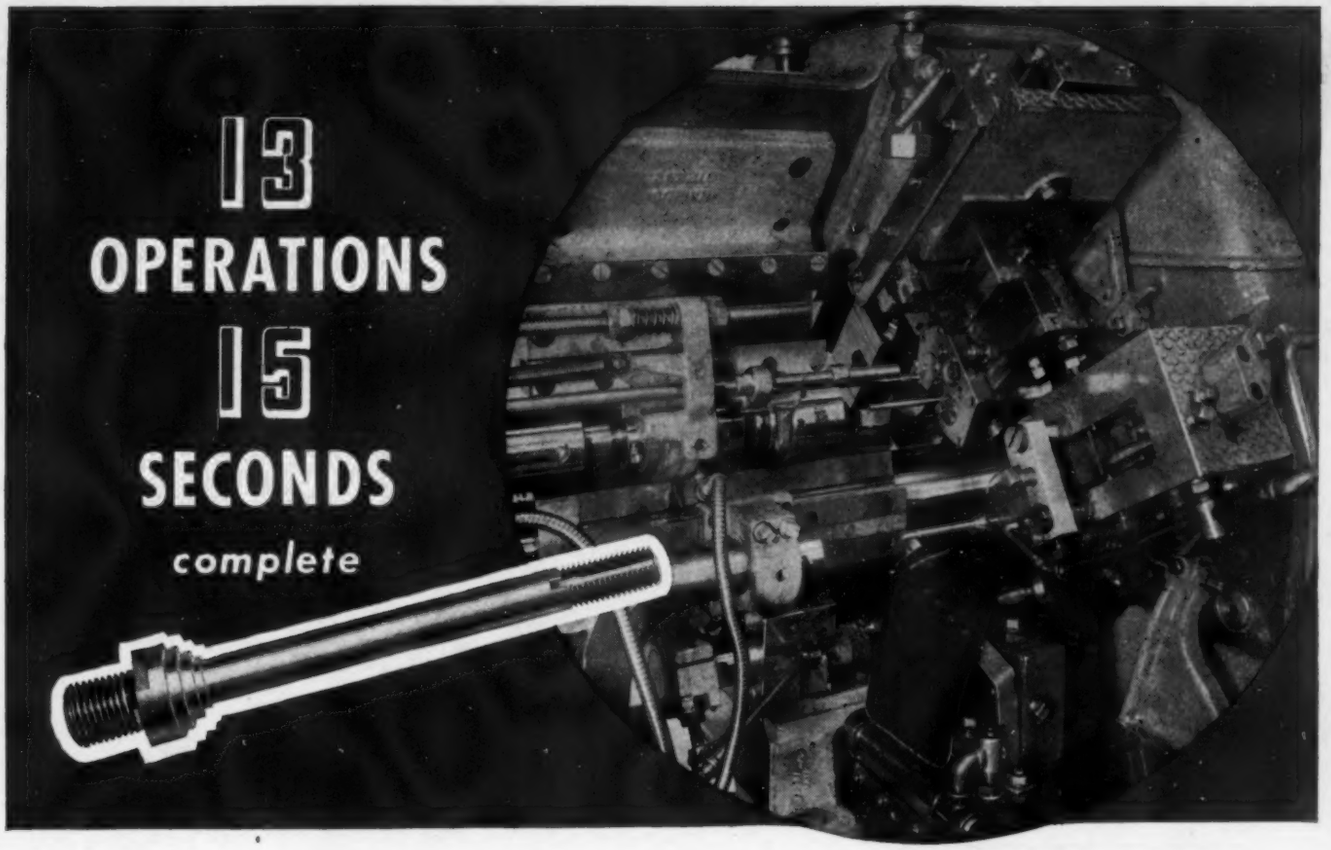
ONE BAY OF VULCAN TOOL COMPANY'S (DAYTON, O.) PLANT

Plenty of space — skilled craftsmen — outstanding equipment contribute to Vulcan quality tools, special machinery, fixtures, and dies. Vulcan can handle complete tooling programs.

ASK FOR EQUIPMENT LIST 1147

Vulcan Tool Co., Lorain Ave., Dayton 10, Ohio

13 OPERATIONS 15 SECONDS complete



Second operations cost men, money and machines—often needless. You can't use old-fashioned, high-wheel Safety Bike methods to make a profit on parts for today's racer bikes.

Modern Acme-Gridleys will produce these racer parts—and any other metal parts, too—at racer speeds. Flexibility of tooling and the broad use of ingenious attachments eliminate many second operations.

You owe it to your profit and loss statement to investigate how Acme-Gridley 4, 6 and 8 spindle bar and chucking machines can save you time, space, manpower and machining costs by stepping up your parts production. May we give you the facts?

PROFITABLE PRODUCTION—THE ACME-GRIDLEY WAY

PART—Bicycle Pedal Shaft.
SIZE—$\frac{3}{4}$" dia. x $4\frac{5}{8}$"

MATERIAL—SAE 1112 Steel
MACHINE—Acme-Gridley $1\frac{1}{4}$" RA-6 Bar Automatic.

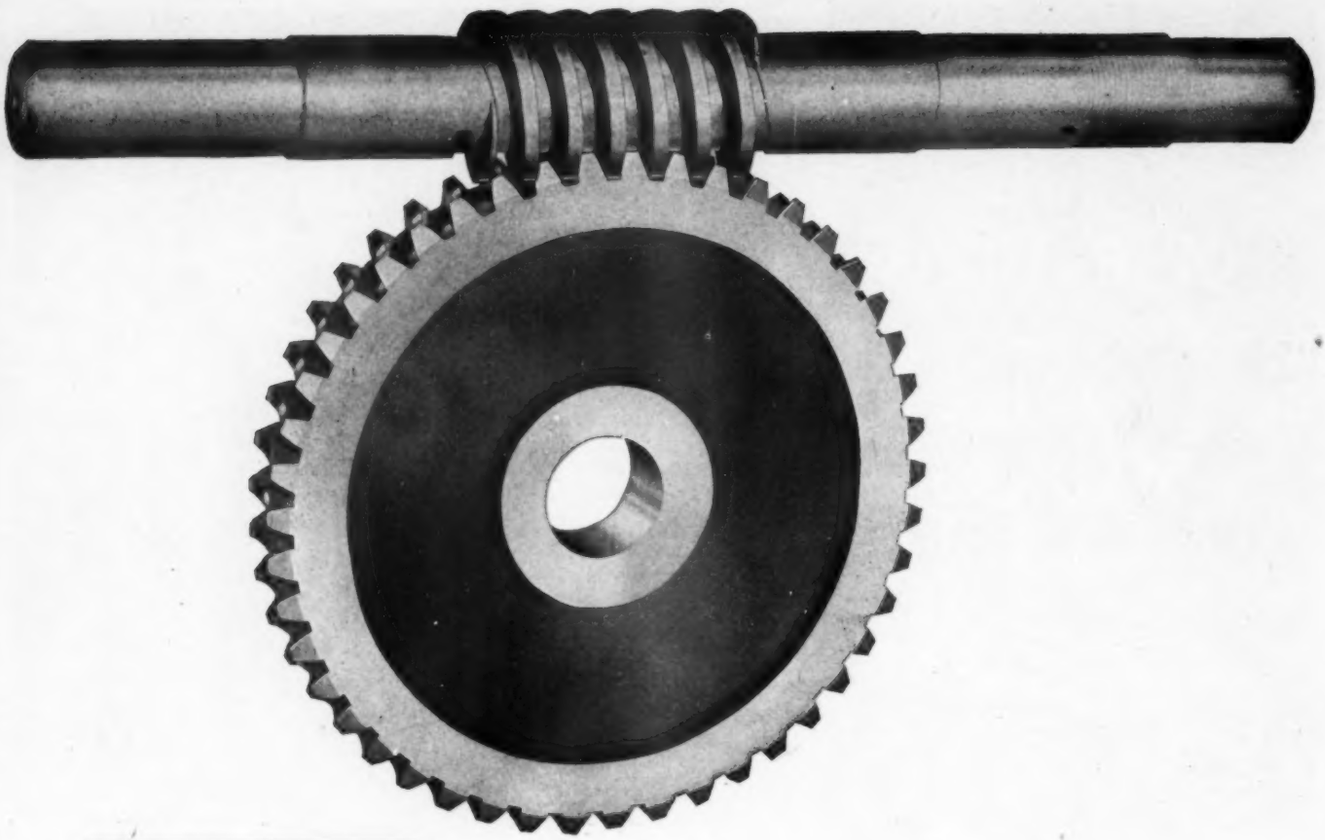
OPERATIONS—13, including shave large thread diameter and roll thread, mill flats on large diameter, die thread and mill keyway on small end.

MACHINE TIME—15 seconds, or a production rate of 240 per hour.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



the ADAMS line

SPUR GEARS
HELICAL GEARS
BEVEL AND MITER GEARS
WORMS AND WORM GEARS
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INTERNAL GEARS (Spur and Helical)
RATCHETS
SPLINED SHAFTS
RACKS
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GROUND TOOTH GEARS (Spur and Helical)
SHAVED TOOTH GEARS (Spur and Helical)
GROUND THREAD WORMS

You'll profit by putting your gear cutting problems in the hands of GEAR SPECIALISTS

Whatever your requirements, you'll find that it pays to have your gears made to order by specialists. Here at Adams we have the skilled personnel, the precision equipment and the specialized experience necessary to produce high quality gears made exactly to your specifications. The next time you need gears be sure to get in touch with Adams. THE ADAMS COMPANY, 1942 Bridge Street, Dubuque, Iowa.

The ADAMS Company
Dubuque, Iowa, U. S. A.

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS . . . ESTABLISHED 1883

Doing the Unusual...

AT SWINDELL BROS., INC.

BALTIMORE, MARYLAND

"20 to 40 minutes saved on each piece"

"three times as fast"

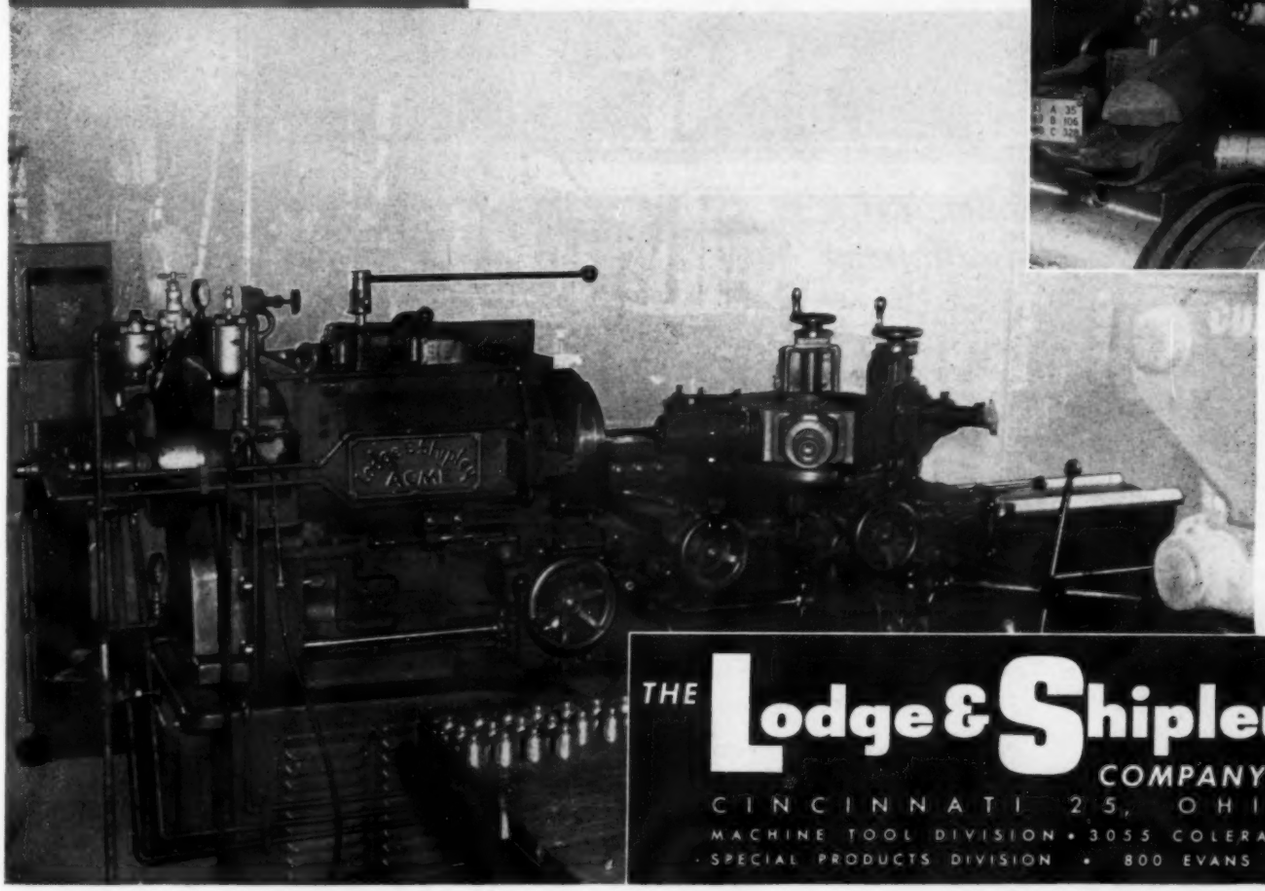
"fine accuracy"

"Ideal for the purpose", says Swindell Bros., Inc. of their Lodge & Shipley Acme Saddle Type Neck Ring Turret Lathes, used in the manufacture of neck rings and sleeves for bottle molding machines. Utilizing all the turret stations plus two operations on the cross slide, chilled cast iron is turned, bored and faced at a rate never before approached with former equipment.

These figures and data . . . based on more than a year's operation . . . reflect the universal satisfaction of Lodge & Shipley Acme Turret Lathe owners who find it far easier to get more production in less time on these modern Turret Lathes.

Lodge & Shipley Acme Turret Lathes are produced in a wide range of types and sizes. Lodge & Shipley Engineers will be glad to give you details. Write for catalog.

Lodge & Shipley ACME TURRET LATHES



THE **Lodge & Shipley** COMPANY

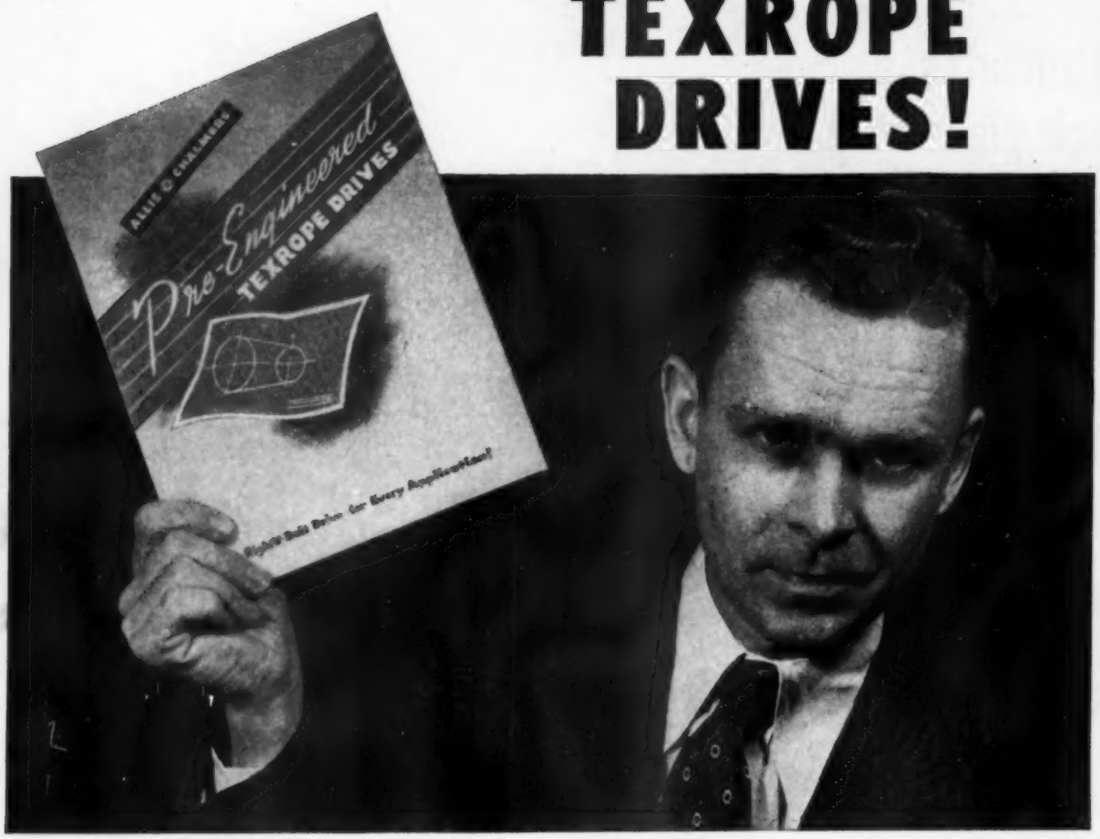
CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

NEW MANUAL PRESENTS

Pre-Engineered TEXROPE DRIVES!



Selects Most Economical Drive for Any Installation!

NEVER BEFORE has specification of the *right* V-belt drive been made so simple, so unerring. You turn to a page, run down a column, and there, in *one place* is the drive you need . . . number of grooves, diameters of sheaves, size of belt. No turning from table to table, no figuring.

These *Pre-Engineered* stock Texrope drives cover 90% of all requirements. Texrope engineers have carefully selected each one, using economical *stock* belts and sheaves. Each selection is the *one best drive* for a given requirement of power, speed and dimension.

For the few cases not covered by *Pre-Engineered* stock drives, the manual provides complete, carefully arranged engineering data to make it easy to figure special drives.

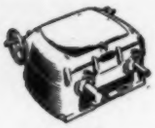
Now Available . . . 144 pages, indexed, size 8½ by 11 inches. The most complete V-belt drive manual ever published. A book that only Allis-Chalmers can give you. Copies have been sent to many Texrope dealers and users. If you have not received one, write for Texbook No. 20P40. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2333

TEXROPE .. Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.



SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

Texrope, Super-7, Texsteel, Texdrive, Magic-Grip and Vari-Pitch are Allis-Chalmers Trademarks

ALLIS-CHALMERS

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

WANT *BETTER QUALITY* IN THE SMALL GEARS YOU BUY?

FRACTIONAL HORSEPOWER GEARS that run *smoother,* that *last longer,* and that are more *uniform* have been a highly developed specialty of ours for more than 25 years! Applying *all* of our energies to designing and manufacturing the *world's finest* Small Gears has brought constant improvement in methods, machinery, materials and men. Perhaps the best measure of our success in making Small Gears *better* lies in the distinction of being the "world's largest exclusive manufacturers of Fractional Horsepower Gears!"

If your requirements call for a production run of Small Gears be sure to talk it over with a G.S. Engineer. Chances are his long experience and the unique facilities at his command may result in a better gear, quicker and at a moderate cost. Send us specifications, drawings or a sample gear today. Depend upon us for the right kind of service and cooperation.

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GEAR Specialties

Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding

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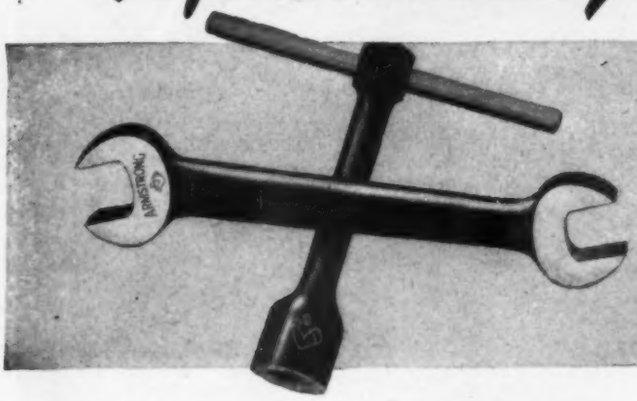
MEMBER OF AGMA

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

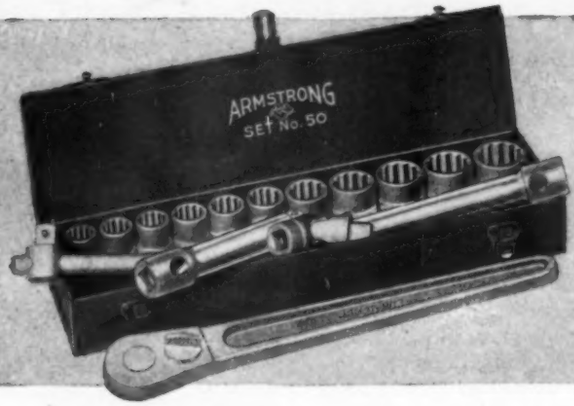
ARMSTRONG

Top Quality WRENCHES



Armstrong Drop Forged Carbon Steel Wrenches including 19 Different Types.

Armstrong Drop Forged Alloy Steel Wrenches including 12 different types.



Armstrong Alloy Steel Detachable socket wrenches and driving units . . . a complete assortment of sets.

For Construction, Armstrong Drop Forged Ratchets. Construction and Structural wrenches in both Carbon and Alloy.

ARMSTRONG BROS. TOOL CO.

315 N. Francisco Ave. Chicago 12, U. S. A.
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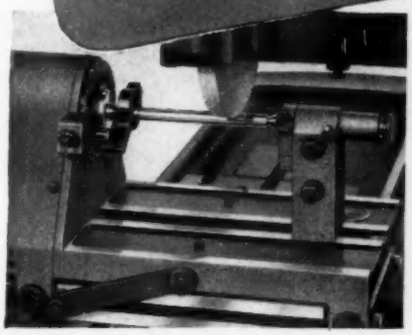
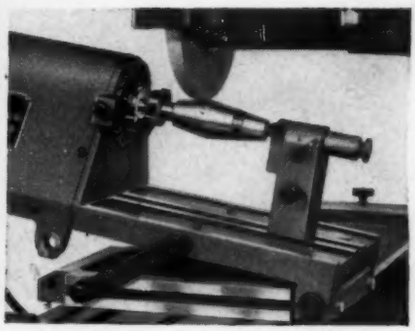
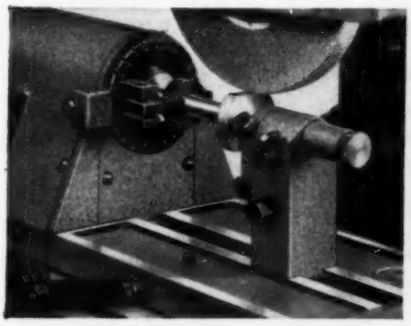
HERE'S A SIMPLE WAY to enlarge Your Grinding Facilities



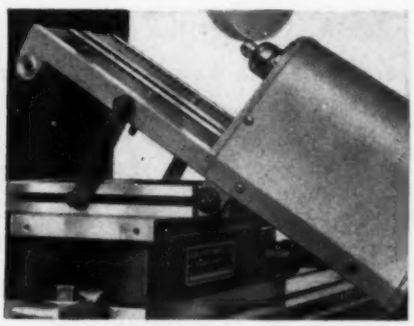
● Grinding work held between centers. Tailstock center is withdrawn for work change by simple swing of lever.



● Grinding taper shank. Attachment is readily adjustable to the desired taper.



● Grinding parallel flats using index plate. Index plate has 24 slots — is locked or released by plunger.



● Angular grinding of work held in spring collet. Attachment is held on permanent magnet chuck.

. . . for Surface Grinders

This new Brown & Sharpe Cylindrical Grinding and Indexing Attachment is designed to be used on surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing. It is a simple way to enlarge your grinding facilities and may make unnecessary an investment in extra equipment.

Straight cylindrical or tapered work is ground between centers or, if ½" diameter or less, can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Centers swing 6" diameter; take work 5¼" in length. Maximum grinding angle, 45°. 1/60 H.P., 115V., A.C. motor is completely enclosed. Write for illustrated folder. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE B·S

NEW SOUTH BEND 9" LATHE CATALOG

Write for it today!

PROMPT DELIVERY
Quick delivery from distributors' stocks or from factory.

PRICES
Start at $145.00, f.o.b. factory. Average price increase over prewar level less than 15%.

TIME PAYMENTS
Factory Time Payment Plan 25% down—twelve months to pay—moderate finance charge.

LARGER SIZE LATHES

South Bend Precision Lathes also made with 10", 13", 14½", and 16" swings. Write for information.

Designed and built to do precision work, the South Bend 9" Precision Lathe is the ideal lathe for the production of small accurate parts, for toolroom work, and for use wherever extreme exactness is essential in the working of metal, plastics, fibre, or other machinable materials.

Catalog 9-J illustrates in full color all models of the South Bend 9" Precision Lathe; lists capacities, speeds, feeds, and general specifications; and shows available attachments and accessories. Mailed on request — write for Catalog 9-J, today!

BUILDING BETTER LATHES SINCE 1906

SOUTH BEND LATHE WORKS

419 EAST MADISON STREET • • SOUTH BEND 22, INDIANA

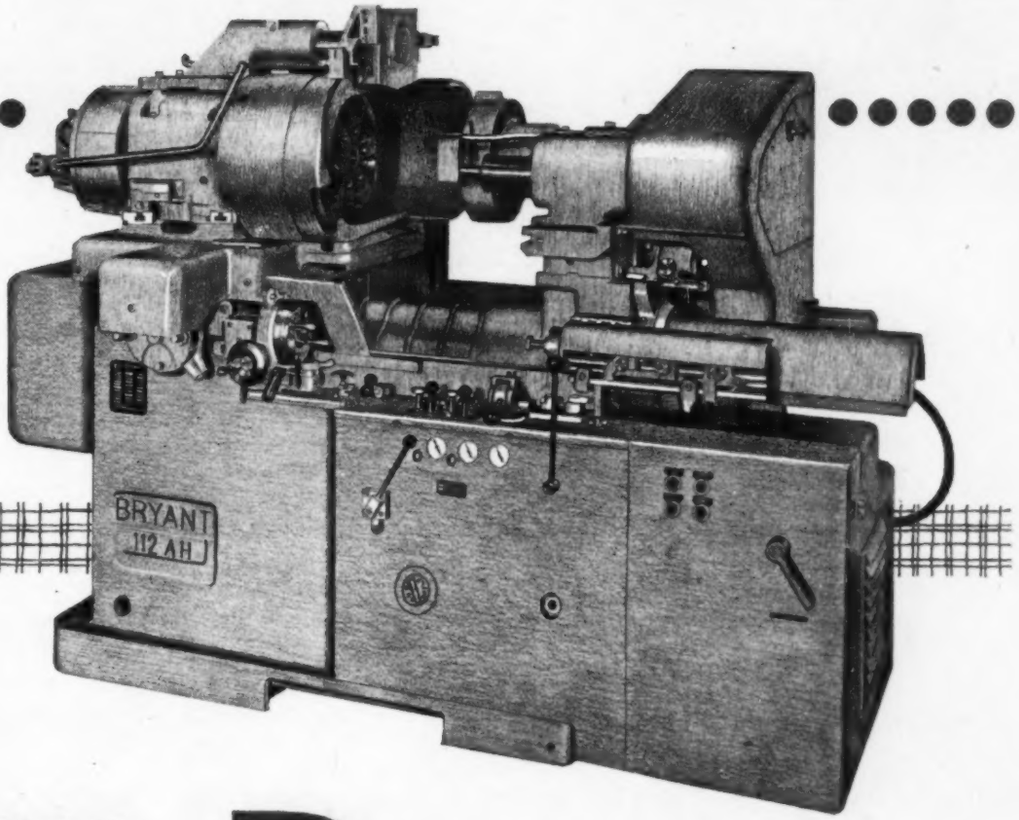
Vermont grows Chameleons, too

The Bryant 112AH Hole and Face Grinder is a real chameleon when it comes to changeover. First, the 112AH is equipped with an American Standard Spindle Nose, so that holding fixtures, chucks or face plates can be changed in less than 2 minutes. Second, selection of cycle phases for either manual or automatic operation is accomplished simply and rapidly through main wheelslide control. Wheelslide traverse for wheel dressing and grinding may be set independently through two convenient hand throttles. Positive-locking reversing dogs set grinding stroke quickly. Third, a rapid traverse cross-feed speeds set-up and a precision feed dial provides accurate size control. Two wheelheads allow grinding the face and bore at one chucking.

In addition to the chameleon qualities the 112AH has features that make it a prolific producer. Wheelheads may be powered by belt for finishing large diameter holes or by the Bryant Hi-Frequency Wheelhead with speeds up to 100,000 r.p.m. for most efficient grinding of small bores. The No. 112AH has infinitely variable spindle speeds from 100 r.p.m. to 2000 r.p.m. Universal stop rod positions speed face grinding. And, of course, the 112AH has all the basic Bryant design and construction highlights, thus making it a producer of finer work finishes within the closest tolerances at speeds you never believed attainable. For complete information on this Vermont chameleon, ask for the Series 112AH Catalog Sheet.

112-AH

HOLE & FACE GRINDER



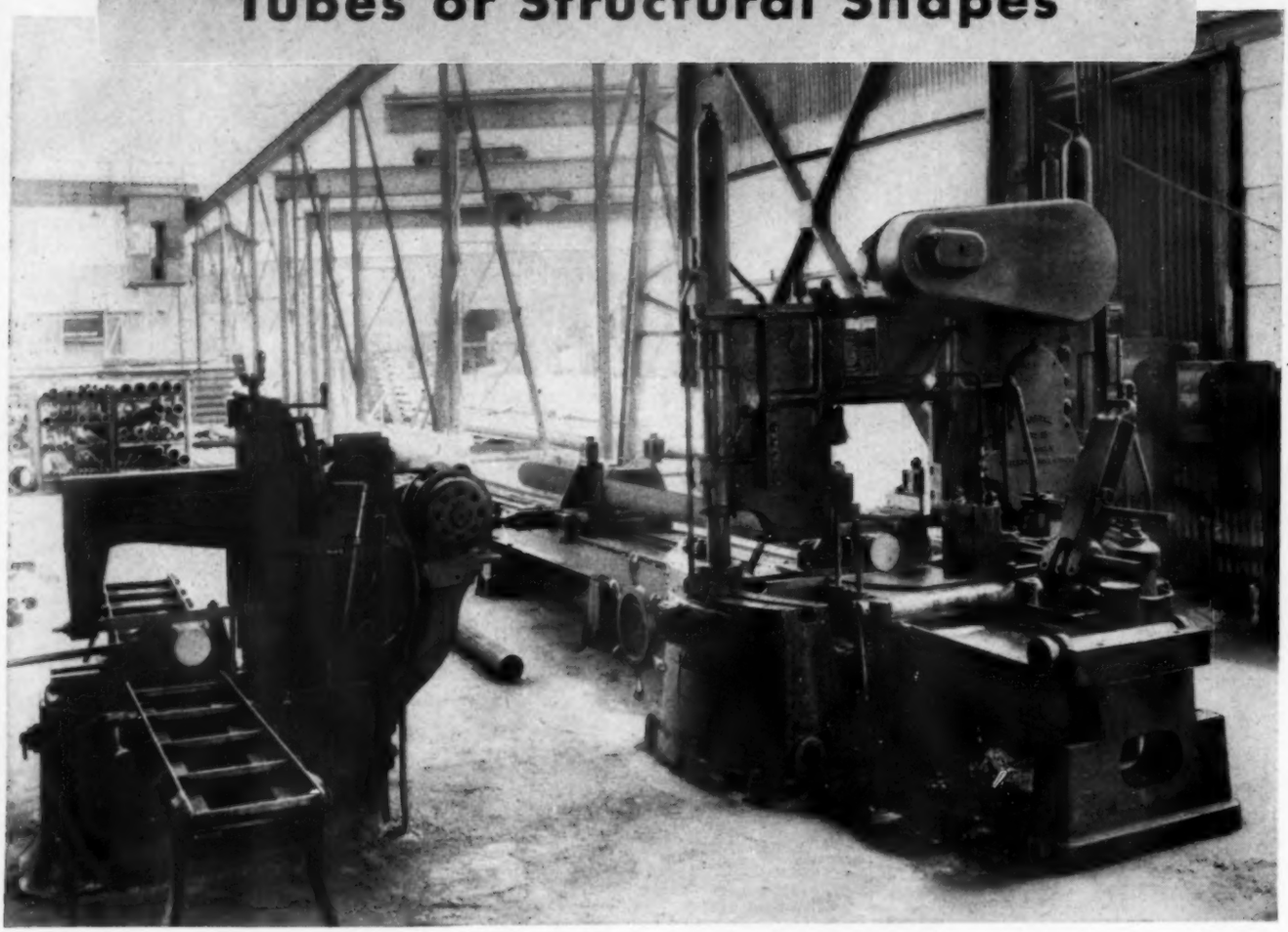
Send for the Man from

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

BRYANT

Ideal for Oil Tools, Forging Bars, Tubes or Structural Shapes



The cutting-off department of Baash-Ross Company takes all sawing jobs as they come for they are equipped to quickly, easily and economically cut off steel of any size, type or shape. In the "oil tool" buiness you cut off about everything from drill rod to giant well drilling tools, from copper tubing to great 18-in. dia. heavy walled steel liner casings for wells. All can be quickly and accurately cut off with the saws illustrated—a No. 9A MARVEL High Speed Hack Saw (Capacity 10" x 10") and a No. 18 MARVEL Giant Hydraulic Hack Saw.

Ask to have the local MARVEL Sawing Engineer analyze your sawing problems, make recommendations and quote prices. Write for Catalog.

ARMSTRONG-BLUM MFG. COMPANY

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE **CHICAGO 39, U. S. A.**

Metal Cutting MARVEL SAWS

Better Machines–Better Blades

We've made the "ROUNDS" for 60 years

Perhaps OUR experience can help YOU!

Yes, for more than a half century, Gisholt has specialized in the field of round and partly round parts . . . building equipment to produce them . . . helping others to use it most efficiently.

Gisholt engineers concentrate on these machine shop problems, visiting hundreds of plants each year to help solve hundreds of problems. They will gladly help you.

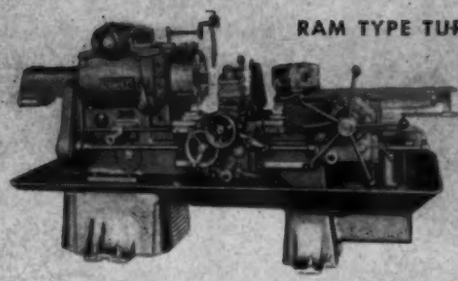
If you have operations in your plant which you think might be improved, we invite you to make use of this experience through the Gisholt Round Table—a clearing house for practical ideas.

Now, and in the years ahead, more emphasis than ever will be placed upon better methods, increased efficiency and lower costs. Be sure you have the best methods and equipment. It pays to "Look ahead—keep ahead—with Gisholt."

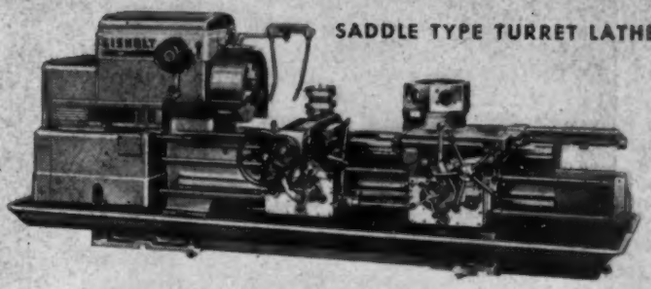
GISHOLT MACHINE COMPANY
Madison 3, Wisconsin

The GISHOLT ROUND TABLE

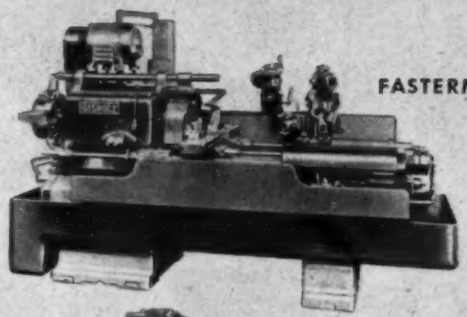
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



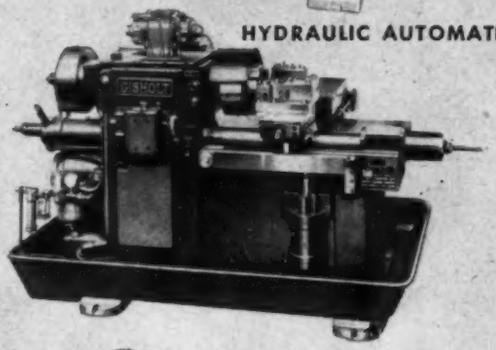
RAM TYPE TURRET LATHES



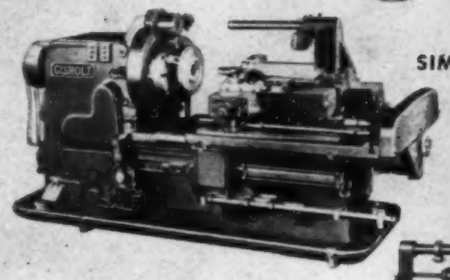
SADDLE TYPE TURRET LATHES



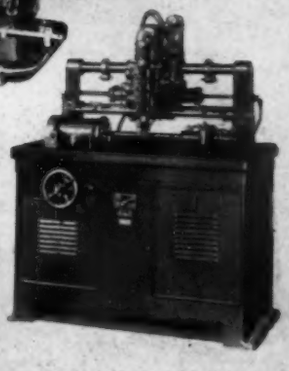
FASTERMATIC



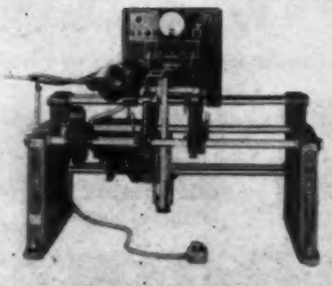
HYDRAULIC AUTOMATIC LATHES



SIMPLIMATIC



SUPERFINISHERS



BALANCERS

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

— *Another Special by Cross* —

New MACHINE BORES AND FACES *Simultaneously*

Cross created this new combination of method and machine to produce axle housings faster than ever before and boosted the production rate to 30 pieces—a gain of 11 housings hourly.

Now boring is completed while the longer cut is being taken across the banjo face—a free ride that saves 55 seconds. This valuable time was previously wasted by conventional cycling; wherein the horizontal feed, for facing, did not start until the vertical boring feed stopped.

Cross engineering and craftsmanship are devoted exclusively to designing and building special machine tools and this profitable performance again demonstrates that it pays to Consult Cross to Cut Costs.

PART: Rear axle housing.

OPERATION: Bore and chamfer banjo hole and face adjacent flange.

PRODUCTION: 30 pieces hourly at 80% efficiency.

FEATURES: ◊ Uses unskilled labor ◊ Push-button control ◊ Single point carbide tools ◊ Heavy drive (25 hp) with additional rigidity for simultaneous cuts ◊ Hardened and ground steel ways ◊ Selective automatic cycle; to bore while facing or bore and face separately ◊ Independent feed movements for boring bar and facing slide; with independent feed range for each ◊ Power elevator in fixture; to lower or raise axle housing ◊ Power clamping.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE CROSS COMPANY

Established 1898

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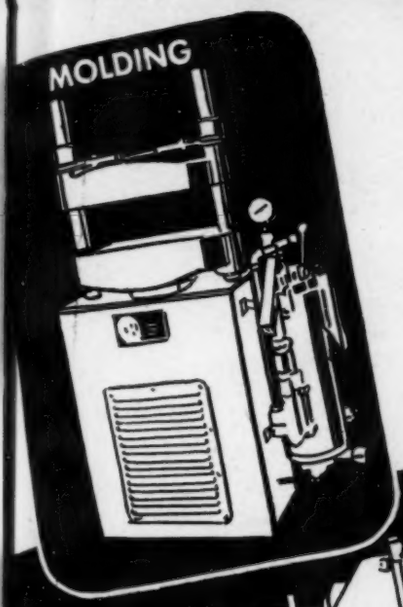
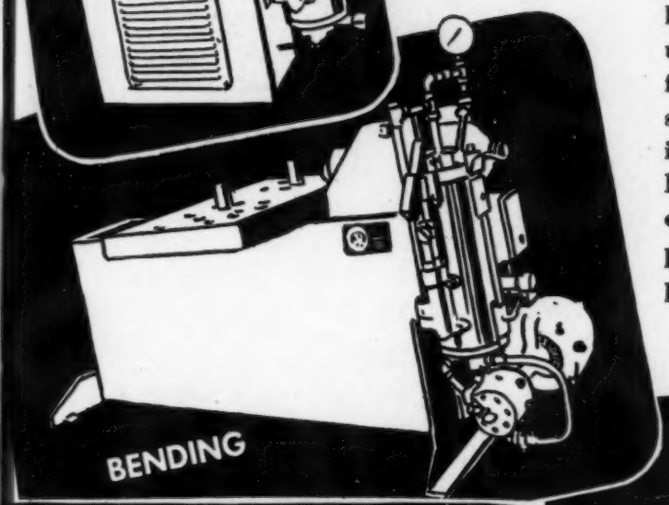
SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

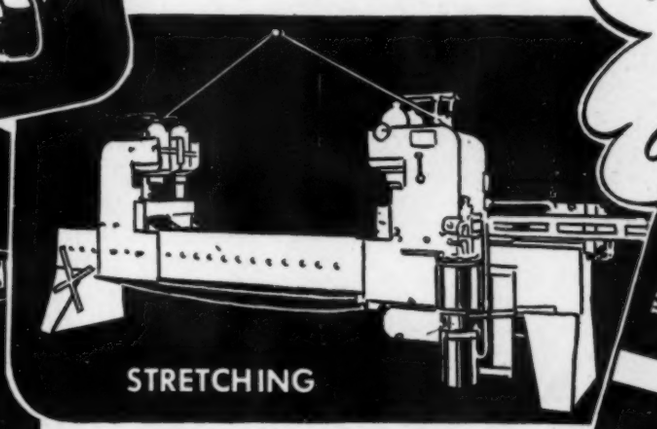
DETROIT 7, MICHIGAN

Name the JOB! There's a KRW PRESS that can do it BETTER... for LESS

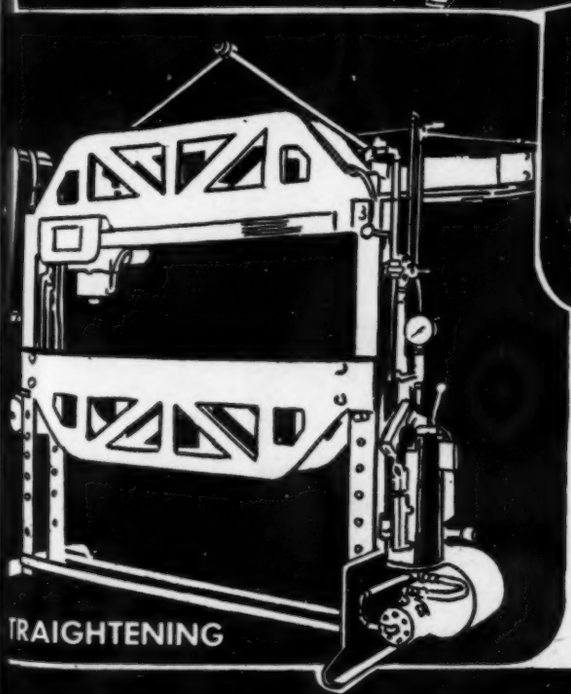




● Illustrated here are four KRW Hydraulic Press adaptations that are typical of many being built by KRW today. All are priced from 30 to 200% less than competitive makes of comparable tonnages or capacities. All are motor-driven and incorporate the time and production proven features that have made the standard KRW Hydraulic Arbor Presses... *the most widely used press of their type in America.* Take the KRW Sliding Head Straightening Press as an example. This type KRW Press has been effecting tremendous labor savings in fabricating plants where plate must be "trued up" before it is processed or fabricated. The heavy, hand method formerly used was archaic and very costly by comparison. The same story holds true of KRW Stretcher-Levellers, KRW Blanking and Forming Presses, KRW Compression Molding Presses, KRW Bending Presses and many others. To save your time and ours, tell us your problem in terms of what you want to accomplish. We'll give you an answer and furnish literature that is pertinent to your needs. Mail the coupon now.



Write for the **NEW KRW** *Catalog.....*



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K. R. Wilson, 215 Main Street, Buffalo 3, N. Y. 11

Please send your catalog. We are particularly interested in your

Bending Presses ☐ Compression Molding Press ☐

Straightening Press ☐ Stretcher-Leveller ☐ Forming and Blanking Press ☐

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Enduring Precision

This spindle bearing is standard equipment on large spindles designed by a world-famous builder of precision grinders. For extreme accuracy, for freedom from vibration, and for enduring precision, only sleeve bearings will do. Where other types of bearing retain their accuracy only for months, Bunting Spindle Bearings endure for years. Where other complex types require a surgical standard of cleanliness and a watchmaker's skill for replacement, the Bunting Sleeve Bearing requires only common-sense and the services of a good mechanic.

The secret of this performance and long life lies in the film type of lubrication. A properly designed and well lubricated sleeve bearing need not acknowledge any superior. No other bearing type possesses its simplicity, its ruggedness, its ability to deliver accurate work for many years. These attributes are possessed by the sleeve bearing.

Bunting engineers are at your service whether your problem is a precision grinder spindle, an aircraft engine, an automobile engine, or something of more or of less exacting requirements. Bunting engineers utilize their extensive experience with bearings of all types in their work of designing Bunting Cast Bronze Sleeve Bearings. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

Bunting

BRONZE BEARINGS

PRECISION BRONZE BARS

BUSHINGS

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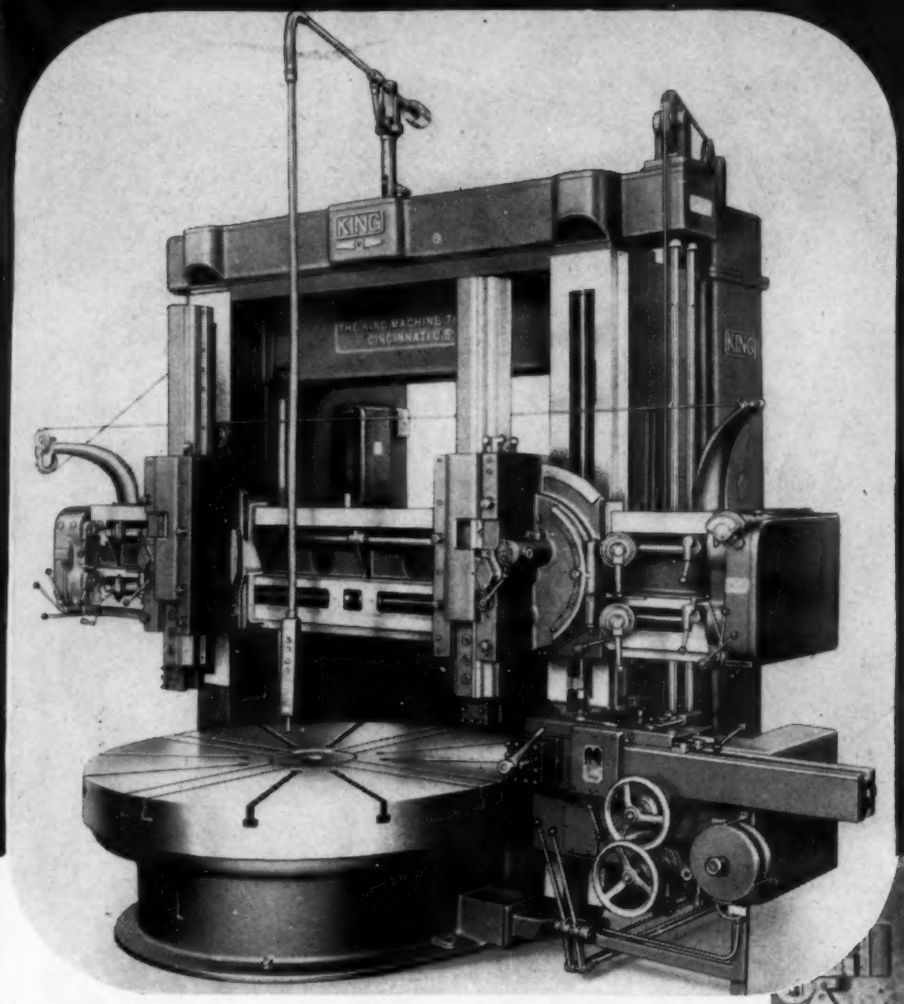
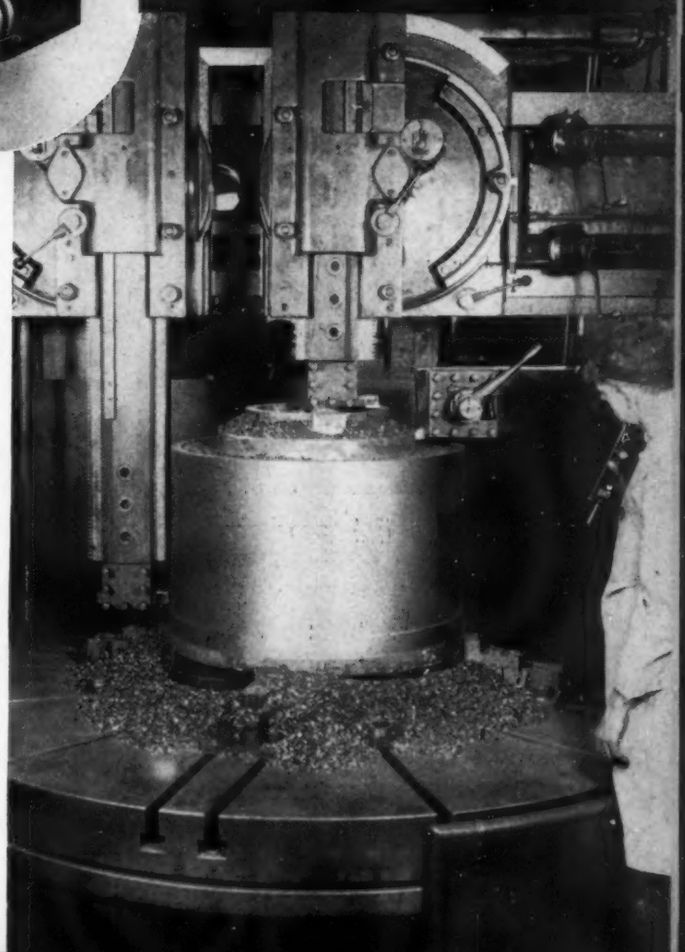


For your tough jobs large or small

★

The **NEW** *Series*

KING



● Whether the job is large enough to take the full swing of the machine or merely a small job it can be handled economically on the new KING.

This new series vertical boring and turning machine has considerably more weight—new rectangular type rams—saddle for ram head square locked and fitted with four tapered gibs for adjustment—a heavy tie plate across the swivel and other construction points that assure greater rigidity, strength and accuracy.

Illustrated at the right is a 30" diameter drum on a large machine which is being turned on two diameters and faced at one time—all three heads operating simultaneously on the work. This is only one of many ways in which this new series KING can be used to advantage regardless of the size of the work.

On your turning, boring and facing work requiring greater production and lower costs to meet competitive conditions investigate the new series KING.

Available in ten sizes from 30" to 144".

WRITE FOR DETAILS

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines and Sebastian Lathes

Master Hobs

Master hobs made by Atlas Tool Works, Bridgeport, Conn. Bethlehem 67 Chisel tool steel was used for both hobs.

. . . of Bethlehem Tool Steel

Master hobs are fine examples of the art of the toolmaker—precision tools, often of intricate design, that exact the utmost skill of the metal craftsman. Shaped so painstakingly, these hobs are destined for drastic shocks and severe compression in the production of hobbings for die castings, plastic moldings, and other molded products.

Here's a job for a tough, shock-resisting steel . . . Bethlehem 67 Chisel tool steel. This grade combines the essential attributes for super shock-resistance—high tensile strength, hardness, and extreme toughness. 67 Chisel holds sharp corners, keeps a fine cutting edge, and resists abrasion in the most severe shock applications.

It's a natural choice for master hobs, yet it has other important uses, such as tools for chipping, calking, beading, and battering; water-cooled dies; hot-header dies; shear blades; punches; rivet sets; studs and bolts for elevated temperatures. In addition, it has many uses as a hot-work tool steel where the tool operating temperature is below 1050 F.

Typical analysis: C—0.50, Si—0.75, Cr—1.15, V—0.20, W—2.50. Easy to forge, machine, and heat-treat.

67 Chisel is ready for prompt shipment to distributors and mill customers from the Bethlehem mill depot. Get full facts now from your nearest tool steel distributor or Bethlehem district office.

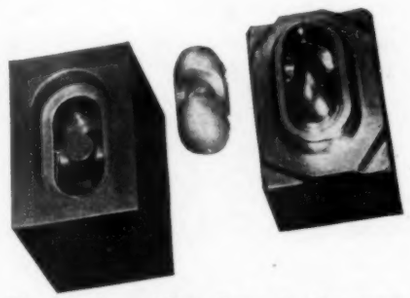
Bethlehem Steel Company, Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

This master hob, shown at left, is used to impress the hobbing in the center. The die casting at right is a multiple gear for use in a computing gasoline pump.



The plastic molding shown in the center serves as the door catch for a refrigerator. The mold at the left is an accurate reproduction of the master hob on the right.

67 Chisel . . . one of Bethlehem's Fine Tool Steels

The CONE AUTOMATIC MACHINE COMPANY *sees many* GOOD THINGS AHEAD

It is reported that . . . . . .

An optical comparator, developed by Westinghouse, compares the grain sizes of metal samples on a glass screen.

get ready with CONE for tomorrow

Westinghouse Lamp Div. is drawing tungsten wire as fine as .0018" a pound of which is 950 miles long.

be ready with CONE for today

The Hypermatic, a high-speed punch press made by Lempco Products, Inc. of Bedford, Ohio, is claimed to be vibrationless, even at top speed.

get ready with CONE for tomorrow

Union Pacific RR is experimenting with the adaptation of a 10,000 h.p. aircraft gas turbine to locomotive use.

be ready with CONE for today

Minneapolis-Honeywell Regulator Co. has an electronic compass for aircraft that has no moving parts and can be used as a magnetometer in prospecting.

get ready with CONE for tomorrow

In the attempt to push air speeds into the transonic range, Curtiss-Wright Corp. has developed a propeller with crescent-shaped, "swept-back" blades.

be ready with CONE for today

Brighter, cleaner and more durable shades of brown for enamels, paints, inks, plastics, etc. are forecast in duPont's announcement of its new pigment "Auric Brown."

get ready with CONE for tomorrow

The Type WAA Race Tester offered by Physicists Research Co. provides for both micro-inch measurement of surface waviness of inner and outer bearing races and control of production set-ups.

Pharis Tire & Rubber Co. claims that its two-ply, glass fabric tire is stronger than four-ply rayon.

be ready with CONE for today

The new Crosley is said to be the first postwar car with an aluminum body.

get ready with CONE for tomorrow

American Welding and Mfg. Co., Warren, Ohio, is ready to road-test its application of torsional springing to railroad car trucks.

be ready with CONE for today

Lundberg-Ryan Air Explorations have ordered two Bell helicopters specially equipped for oil and ore exploration.

The National Electrical Manufacturers' Association is engaged in the standardization of small electric motors, such as those used in household equipment.

get ready with CONE for tomorrow

General Electric Co. has designed pallets of corrugated board which save shipping weight and can be thrown away after one use.

be ready with CONE for today

The top of an 85-foot, million-gallon tank at the U. S. Air Force Olmstead Airbase is being formed by spraying concrete over wire mesh.

get ready with CONE for tomorrow

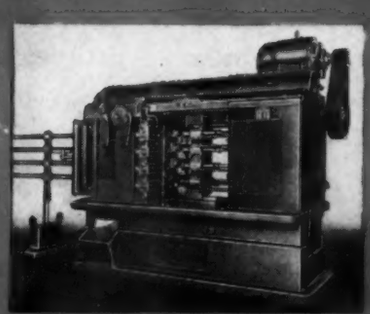
Volumetric measurement of corrosive liquids to an accurate approaching laboratory precision is made possible by a new meter made by Browser Inc. of Fort Wayne.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

NOW

In the Multi-Single 4-Spindle Conomatic, you have one machine that will produce in volume, accurately and with quality finish, the production of 4 single spindle machines—*in the floor space of one.*

The 4 connecting links illustrated are produced from .437" S.A.E. 1113 in a cycle of 6 seconds, which effects a time of 1½ seconds each.



Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

45

CORRECTLY hardened under modern scientific control and then finished after hardening by the exclusive HANSON PROCESS, these taps are truly Precision Tools. That is why they cut clean, accurate threads, deliver an extra amount of work between grinds and stand up to the limit on tough jobs.

Result: Lower cost per tapped hole, and good reasons why you should use Hanson-Whitney Taps.

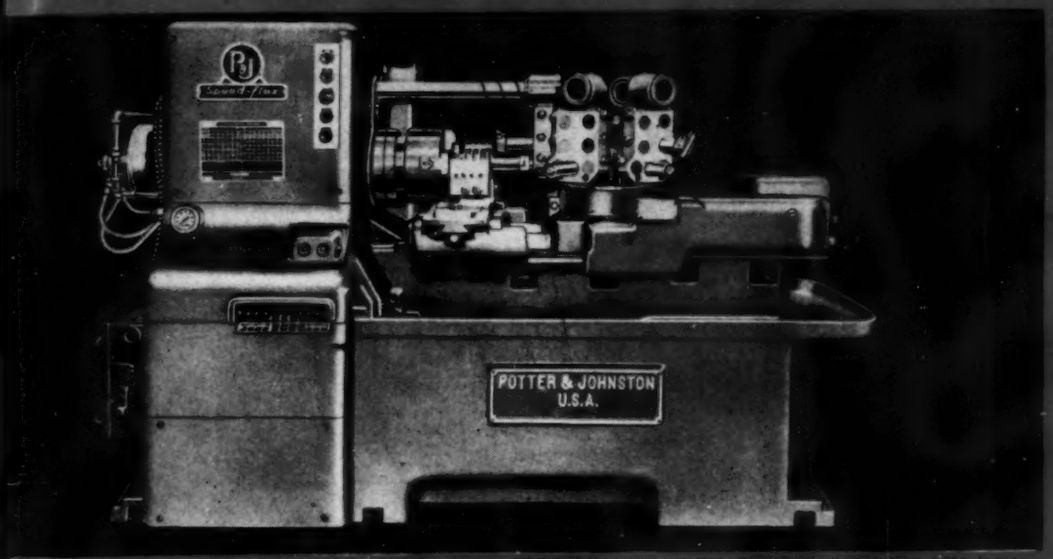
Our engineers would welcome the opportunity to study your tapping problems — write today.

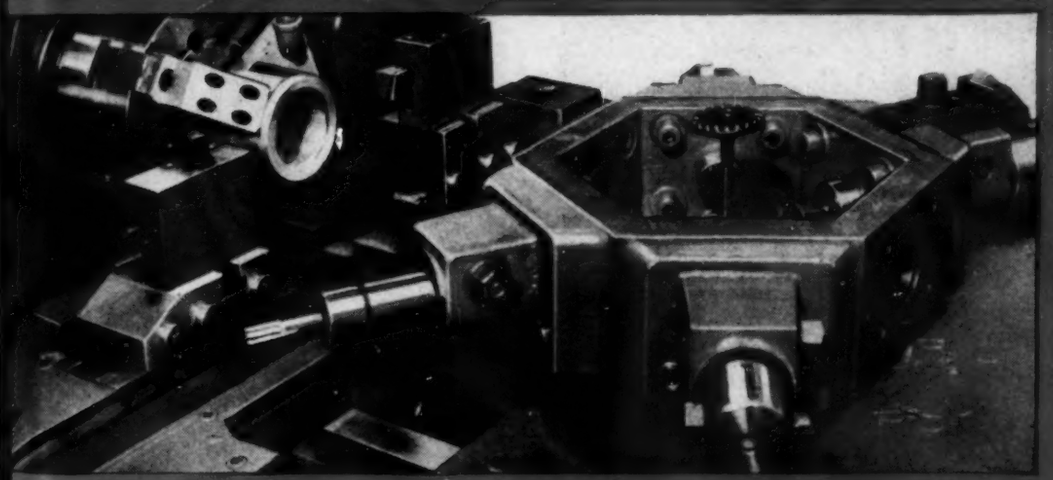
Hanson-Whitney

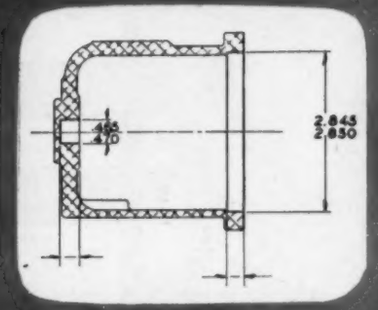
MACHINE COMPANY

HARTFORD • CONNECTICUT

Tooled for the Job, this P & J 3U SPEED-FLEX machines a piece every 45 seconds







DETAILS OF JOB

Part: Governor Body

Material: Die Cast Aluminum

Method and Operation:

Presenting closed end to spindle, grip on body with two fixed jaws and one swivel jaw.

Machine as follows:

1st T.F.: Bore 2.845" dia.; rough and finish face end.
2nd T.F.: Machine .465" dia. to depth.
3rd T.F.: Ream 2.845" dia. x 3/16" deep.
4th T.F.: Ream .500" dia.

Average time per piece, floor-to-floor: .76 min.

Actual production time (floor-to-floor) on the governor body being machined here is .76 minutes, equivalent to approximately 80 per hour. Fast work such as this is by no means exceptional when handled on the P&J 3U Speed-Flex, a new Automatic Turret Lathe designed especially for the machining of small castings and forgings up to 6" diameter. Like all P&J machines, the 3U Speed-Flex provides for wide flexibility in tooling.

Standard spindle speed range is from 73 to 1445 rpm with optional dual speed ranges of 36 to 711 and 73 to 1445 rpm. Six faces on the turret simplify the mounting of tools. Split-second automatic changes in feeds and speeds under electro-pneumatic control, available with the machine under cutting load, reduce non-cutting time to a minimum.

Further details are available on request, as well as the cooperation of P&J engineers to help you simplify your problem of producing duplicate parts.

. . . POTTER & JOHNSTON MACHINE CO., PAWTUCKET, R. I.

Pioneer Manufacturer of Automatic Turret Lathes

FOURTEEN TYPES

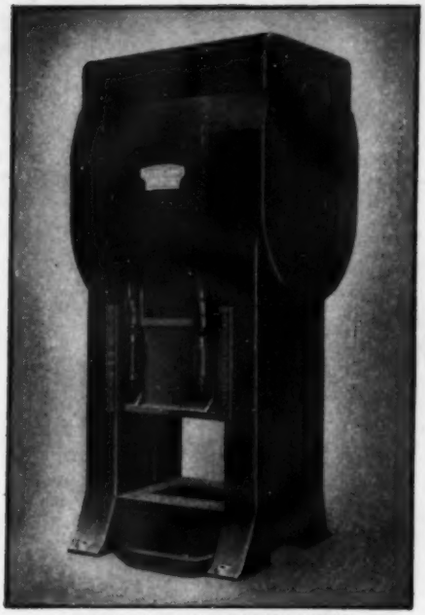
INCLINABLE • HORNING • PUNCH TYPE

PUNCH TYPE HORNING • GAP • KNUCKLE JOINT

TRIMMING • FORGING-SIZING • TOGGLE

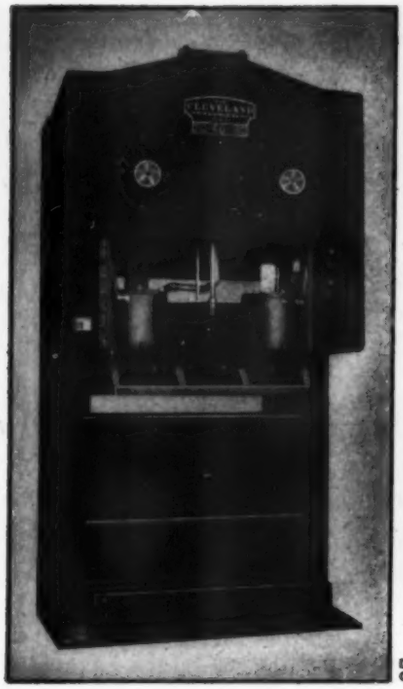
STRAIGHT SIDED CRANK • STRAIGHT SIDED ECCENTRIC

SINGLE POINT • TWO POINT • FOUR POINT



SINGLE CRANK, DOUBLE ACTION TOGGLE.

CLEVELAND PRESSES



DOUBLE CRANK, OPEN BACK, GAP

Because no single type of Power Press is suitable for the economical production of all pressed metal products, Cleveland offers manufacturers who are seeking higher manufacturing efficiency with lower operating costs, a complete range of fourteen types of Presses, in sizes and capacities to meet particular requirements.

Therefore, when you consult Cleveland Engineers about your Power Press problems you have every assurance that their recommendations are not restricted by limitations of either types or sizes but are based solely on the most suitable type and size for the work you wish to perform.

Furthermore, all Cleveland Presses embody every modern feature for long life, dependability, ease of operation, accuracy and profitable production.

MODERN FOUR POINT PRESS

CLEVELAND

THE CLEVELAND PUNCH & SHEAR WORKS CO. • CLEVELAND 14, OHIO

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

USE ALCOA ALUMINUM PIPE *Available Now!*

You can get Alcoa Aluminum Pipe NOW! It's available in standard and extra-heavy weights in sizes up to 12-inch. *Immediate delivery* of small quantities from warehouse stocks located in 24 strategic cities. Prompt shipment of larger quantities from Alcoa's mills.

Alcoa Aluminum Pipe is light, yet strong. Is easy to shape, thread, and assemble. Use standard pipefitting tools and methods. Weighs only ⅓ as much as other pipe. Requires fewer men to fabricate and erect.

Maintenance cost is practically zero on most jobs. Alcoa Aluminum Pipe cannot rust, generally requires no painting. Has high resistance to corrosion by most industrial atmospheres.

Ask the Alcoa Sales Office near you for data and prices. Or write to ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

Compare Strengths! Compare Prices!

(The prices below, given as an example, are based on carload mill shipments of 1-inch Alcoa Extruded Standard Pipe in lengths up to 40 feet with plain ends. All standard and extra heavy sizes up to 12-inch are available with plain, threaded, or beveled ends.)

Alcoa Alloy	Typical Tensile Strength	Typical Yield Strength	Price* per 100 feet
63S-T5	30,000 p. s. i.	25,000 p. s. i.	$16.24
63S-T	35,000 p. s. i.	30,000 p. s. i.	16.53
61S-T	45,000 p. s. i.	40,000 p. s. i.	20.30

*Subject to change without notice.

MORE **people want** MORE **aluminum for** MORE **uses than ever**

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM

This is Herman Engstrom, one of P&W's top precision experts, demonstrating the accuracy of a Pratt & Whitney Jig Borer quill.

We moved Herman and his equipment right out of our shop into our booth in Chicago, so folks could see exactly what we mean by Pratt & Whitney Precision.

That ELECTROLIMIT Height Gage he is using will split "tenths." As he checked quills with it, there was hardly a flicker of the needle. Many a spectator asked if it was stuck! It wasn't!

That's typical P&W Jig Borer Precision — the kind that goes into the machine, and the kind that comes out. Boring jigs to "tenths" is routine for any P&W Jig Borer. Toolrooms all over the country have found new ways to cut costs and save time with this machine. Pratt & Whitney engineers can show you how.

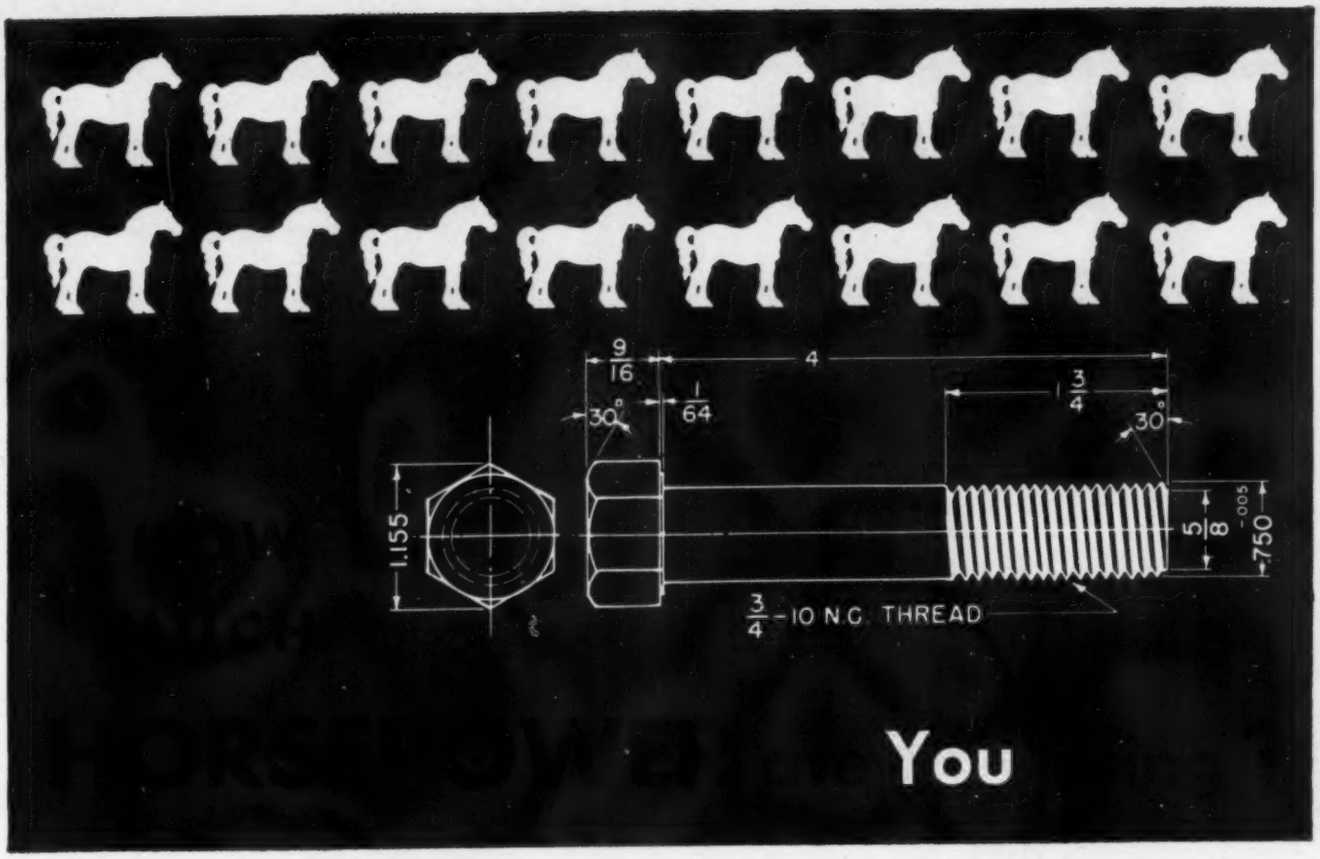
If precision boring is a part of your picture, write TODAY for literature telling "the hole story."

Introduced for the first time in Chicago was the new P&W All-Electric Jig Grinder, which combines Jig Borer precision-locating with precision hole-grinding. This brand new machine is destined to make toolroom history. We will gladly send you complete literature.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT



Here is a typical example of the effective use of carbide cutting tools on a Jones & Lamson No. 3 Universal Ram Type Turret Lathe. The depth of the main turning cut is less than ¼". *Yet the single carbide turning tool creates a load in excess of 16 horsepower.*

Of course, we know this simple, ordinary job would normally be routed to an automatic. But we put it on a Turret Lathe to give you, *a practical, simple example of the horsepower required for effective turning with Carbide tools.*

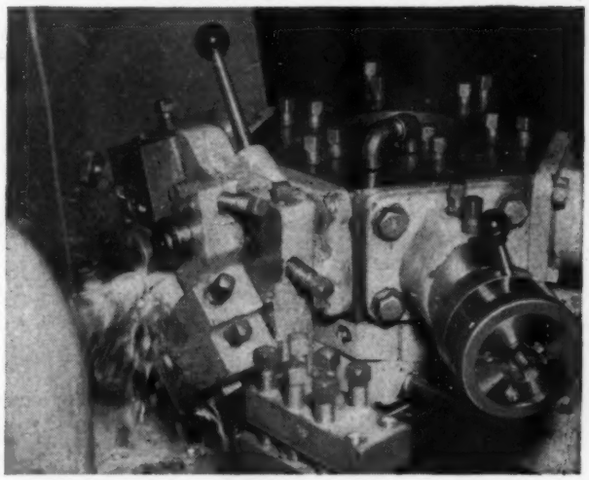
Our folder "One a Minute" describes this operation in detail, and contains vital information for anyone contemplating the purchase of a Turret Lathe, the general use of carbide cutting tools, and greater efficiency in metal turning.

Send for this folder. Or better yet, telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.

Jones & Lamson Lathes are designed specifically for the most efficient use of carbide cutting tools.

This ¾ x 4" Cap Screw is machined entirely with carbide cutting tools except for the high speed steel Chasers in the die head. *Total time per piece is one minute.*

Spindle speed 1500 RPM Feed .033



Powered for Carbide

JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Manufacturer of *Turret Lathes* and Fay Automatic Lathes

Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies

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THE NAME TO REMEMBER for your SHOP EQUIPMENT

Steel End Pieces
Steel Backboard
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Drawer is extra
Steel Full Shelf with an Integral Back-board
Steel Legs flared at base for firm support
Steel Drawer that can be locked

STEEL WORK-BENCHES WITH *STEEL* TOPS

READY-MADE TO MEET PRACTICALLY EVERY SHOP REQUIREMENT

The famous ready-made "Hallowell" Line signifies quality Shop Equipment of sturdy, steel construction, good design, years of wear and utility and the ability to meet practically every plant or shop requirement.

These exceptionally strong "Hallowell" Work Benches of Steel are designed to stand firm and rigid without costly bolting to the floor; and to withstand constant use and abuse. They are made in a number of standard heights, widths and lengths, which are easily moved and joined end to end to form a continuous work-bench of any length.

Several hundred interchangeable combinations make it almost certain that you will find exactly the right bench for your requirements. Write for your copy of the "Hallowell" Catalog.

"Unbrako" and "Hallowell" Products are sold entirely through Industrial Distributors.

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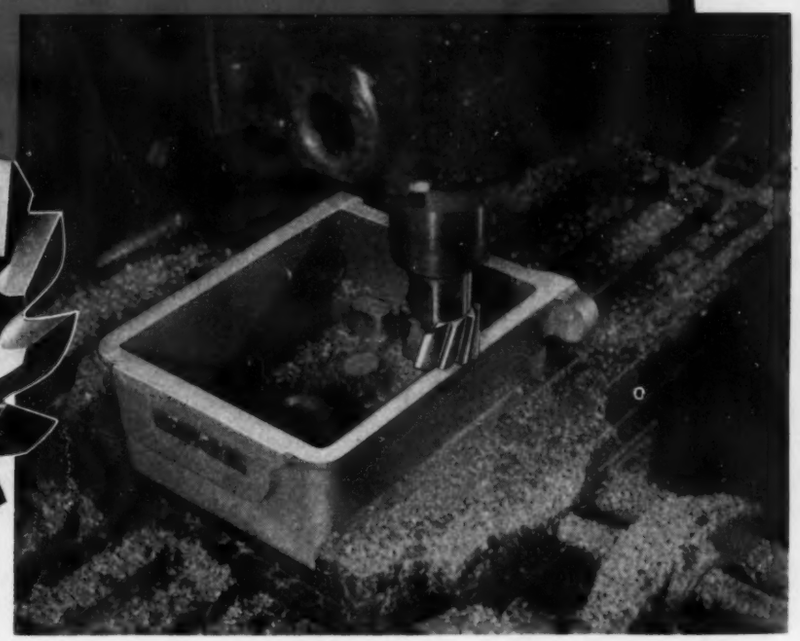
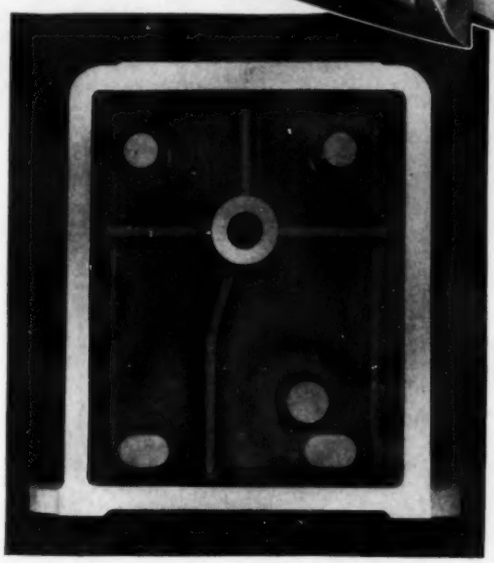
WHERE

Performance Counts!

BARBER COLMAN STANDARD CUTTERS REDUCE MACHINE DOWNTIME





★For example, soft aluminum has a tendency to clog cutter teeth, causing rapid wear. In soft metals, depth and width of cut determine whether standard cutters may be used. On this operation, surfaces must be flat, with good finish. Smooth, sharp cutting edges must be maintained in order to get steady production. Barber-Colman Standard Shell End Mills have sufficient chip space for removing the metal on this cut without clogging. Consequently, they are producing 100 complete cases per sharpening, at a good rate of feed.

B-C Cutter Engineers, through long experience in milling problems, have established sharpening clearances, tool steels, and methods of heat treatment which will produce the best results on a variety of milling operations. These improvements built into Barber-Colman standard cutters are giving maximum tool performance and less machine downtime.

Similar advantages and savings can be realized on your production by using Barber-Colman standard cutters where conditions permit. Specify them on your next order.

JOB RECORD

Operation — Mill 1/2″ rim and 6 inside pads, on cast aluminum case.

Stock Removed — 1/8″ - 5/32″.

Cutter — Barber-Colman standard Shell End Mill, 2″ diameter.

Feed — 20″/minute.

Speed — 350 SFM.

Cutting Time Per Case — 8 minutes.

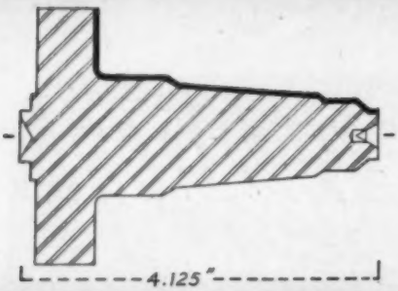
Tool Life — 100 cases per sharpening.

All surfaces must be flat and smooth.

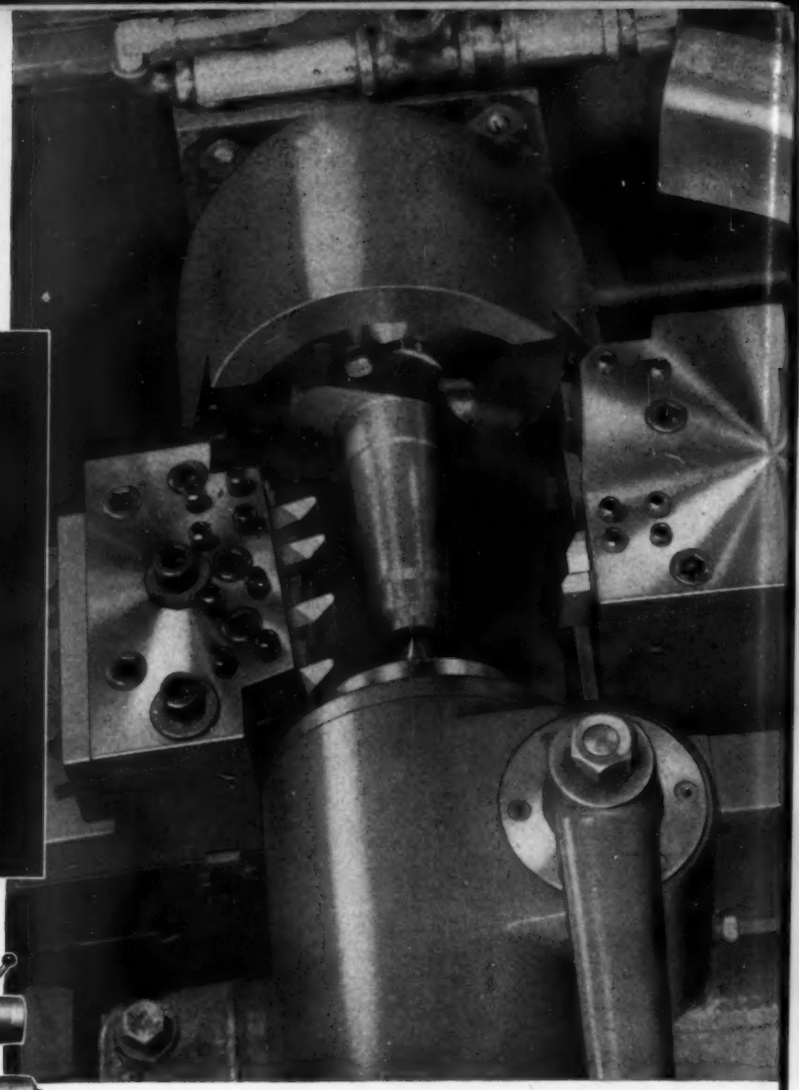
MODERN MACHINES WITH ORDINARY BARBER COLMAN CUTTING TOOLS ARE NOT FULLY EFFICIENT

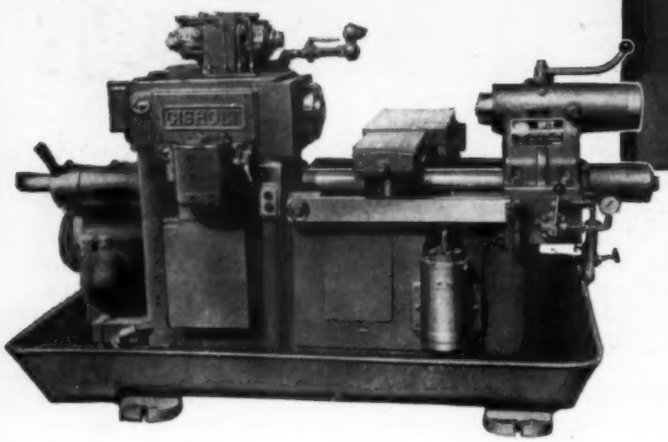
Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST. ROCKFORD, ILLINOIS U.S.A.



take a *Short Cut* on all cuts





with the GISHOLT *Hydraulic Automatic Lathe*

HERE'S a typical example of the ability of the Gisholt No. 12 Hydraulic Lathe to profitably combine a number of cuts in one operation.

In the machining of a type of Diesel Engine Injector Body (material—SAE 4150 steel forging, in lots of about 1000), *one* No. 12 operation is accomplishing the same work that formerly required two operations, one on each of two less versatile automatic lathes. And this work, which used to take about 5 minutes per piece to perform, is now completed in *1.5 minutes on the No. 12.*

Comparable savings are being realized on two other similar types of injector bodies, with rapid changeover, through the machining advantages of the Gisholt Hydraulic Lathe.

One reason so many jobs are done faster on the Gisholt No. 12 lies in the wide latitude of tooling arrangements it makes possible. Operations such as taper turning, forming, angular facing, constant speed radius cutting and intermittent facing can be efficiently combined with orthodox turning, facing, boring, and grooving.

Investigate the characteristics of this advanced automatic lathe that give it such remarkable earning power.

GISHOLT MACHINE COMPANY

Madison 3, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface finishing and balancing of round and semi-round parts. Your problems are welcome here.

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINE

ELECTRONIC HEATER CUTS COST 63% . . . DOUBLES HATCHET-HARDENING OUTPUT

THE JOB . . .

An operation essential to the manufacture of hatchets at Mitchell and Unsinn Company, Washington, D.C., is heat-treating, in order to harden the blade and head surfaces.

THE OLD METHOD . . .

Hatchets were conveyor-fed through a preheating zone, an open gas flame for diffprential heating, and finally into a receiving cage, immersed in an oil bath. After hoist-dumping into a bin, each hatchet was cleaned. If heads also required tempering, the entire process was repeated. To perform these operations, three workmen were required.

THE *NEW* INDUCTION METHOD

An operator now positions the hatchet blade in the work coil of a G-E 20-kw electronic heater, where each blade is uniformly hardened and automatically quenched in a matter of seconds. If the head is to be hardened, the timing controls are reset and the head is run through. Cleaning operations are no longer necessary.

HERE'S WHAT INDUCTION HEATING HAS DONE FOR THIS COMPANY—

1. **Cut Costs**—Former methods, requiring 3 men, were estimated to cost $3.80 per hour; the induction method with only one operator has a total hourly cost of $1.39.

2. **Increased Production**—Former methods produced 650 blades per day, while 1300 are now realized with the induction method.

3. **Reduced Floor Space**—With the compact, automatic electronic heater, bulky handling and conveyor equipments are no longer required.

4. **Better Working Conditions**—The induction installation is clean, cool, and convenient. No more high ambient temperatures or oily floors.

GENERAL ELECTRIC

WHAT CAN INDUCTION HEATING DO FOR YOUR PRODUCT?

We would welcome the opportunity to give you an unbiased answer to this question. Simply get in touch with the Heating Specialist in the nearest G-E Office. In the meantime, send the coupon for our free bulletins GES-3290A, "The How and What of Electronic Induction Heating," and GEA-4637, "G-E 20-kw Electronic Induction Heater."

Apparatus Department, Sect. A675-172
General Electric Company
Schenectady 5, N. Y.

Please send me your free bulletins GES-3290A, "The How and What of Electronic Induction Heating," and GEA-4637, "G-E 20-kw Electronic Induction Heater."

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Company.....

Address.....

City..... State.....

Those who examined the DeVlieg JIGMIL at the Chicago Show saw a complete new approach to the problems of precision boring. A method broadly applicable to economical repetitive *production work without jigs,* as well as a machine for most advantageously making jigs.

Write today for new descriptive booklet

DEVLIEG JIGMIL

DeVLIEG MACHINE COMPANY

450 FAIR AVE., FERNDALE 20, (DETROIT) MICH.

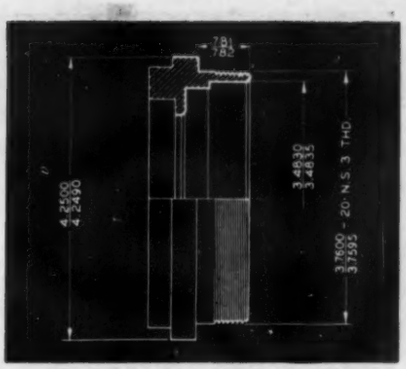
HARDINGE
ELMIRA, N.Y.

PRECISION *Multi-Operation* CHUCKING MACHINE

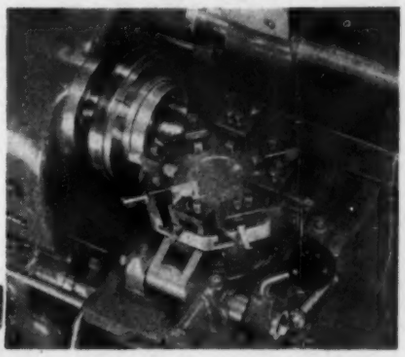
SPECIFICATIONS
6" Step Chuck Capacity
5" Jaw Chuck Capacity
1" Collet Capacity
Spindle Speeds to 3,000 r.p.m.

Here is an example of precision production work easily handled by the new Hardinge Multi-Operation Chucking Machine — in one chucking, twelve surfaces were finished with single point tools to specified tolerances in addition to the threading operation. The tooling was entirely standard, using standard tool bits, step chuck and lead screw. Three of the precision machining operations are illustrated at the right together with the blueprint of the part.

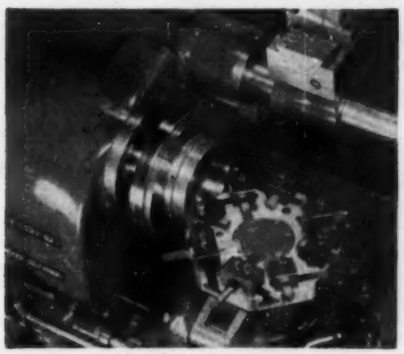
Send for FREE illustrated bulletin.



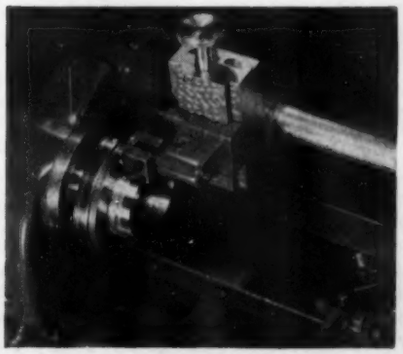
A typical part from rough blank, finished on twelve surfaces (indicated by heavy white lines) and threaded to specified tolerances.



Turning — close-up view showing the part held in a standard step chuck. Threading head withdrawn to give ample space for free turret operation.



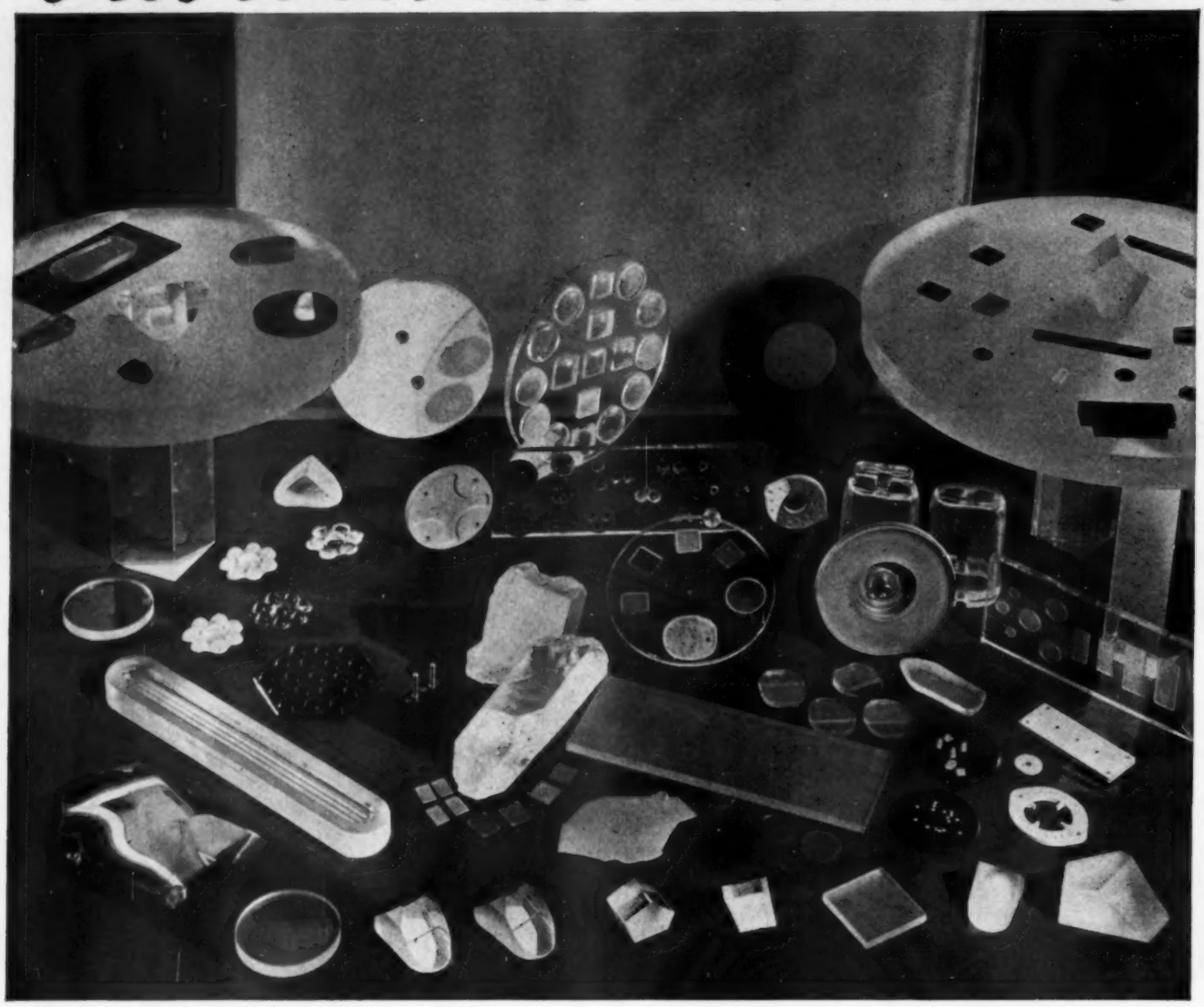
Boring — note the simple standard square tool bits; and closeness of turret to work.



Threading — high speed threading with extreme accuracy because there are no intervening gears.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"Put it on the Blanchard"



All of these pieces—glass, jewels, sapphires, rubies, agate, pyrex, signal glass, quartz prisms and ceramics—were ground on the Blanchard #11 or #18 Grinder. The methods developed for grinding these materials are applicable to many other pieces. We invite inquiries regarding the grinding of these or any unusual materials. Write today and ask for the "Work Done on the Blanchard" book—it will be mailed free.

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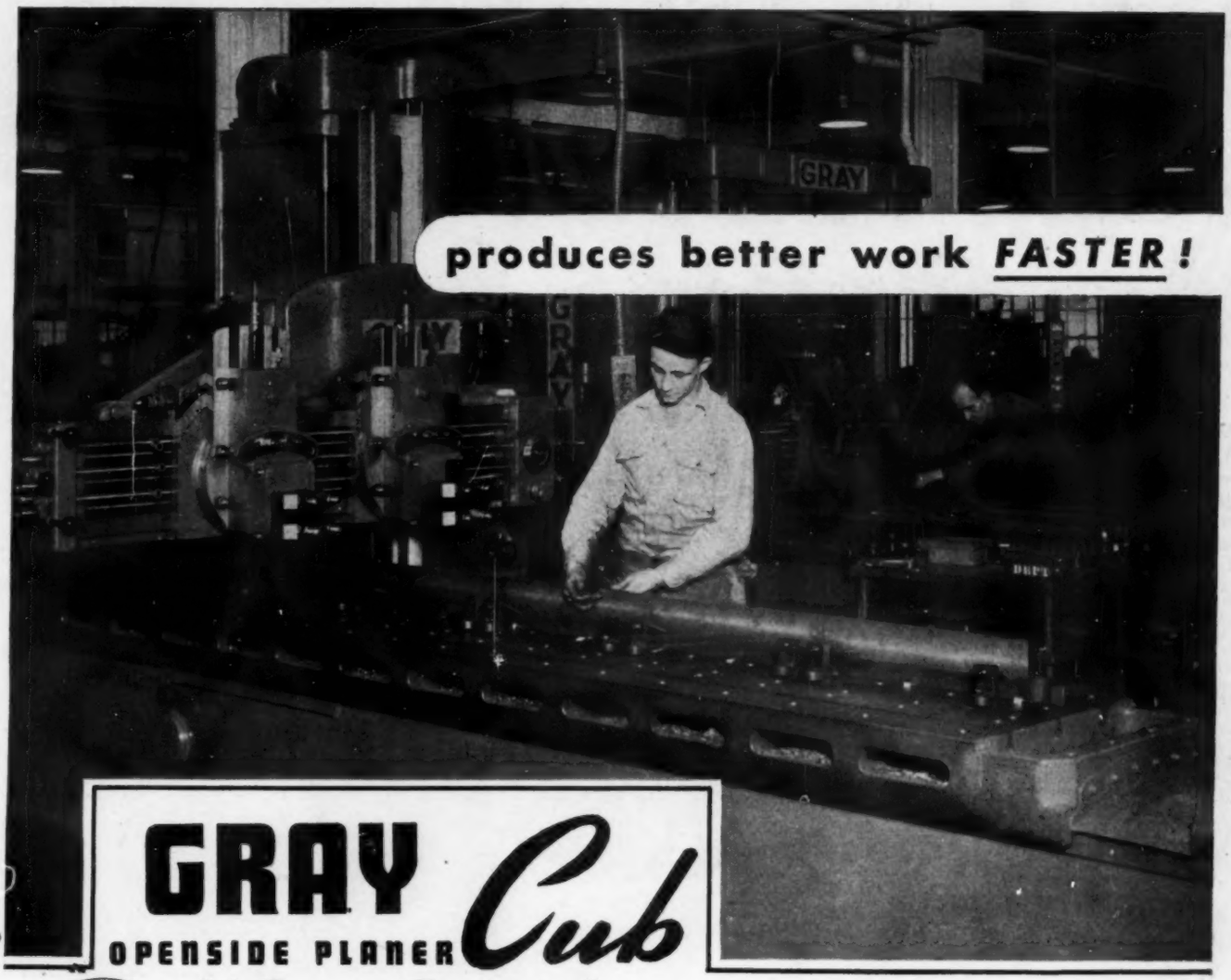

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"A Bear for Production"

GRAY PLANER CUB

THE PLANER SENSATION OF THE MACHINE TOOL SHOW

1. The planer for Carbide Tools—cutting and return speeds up to 300′ per minute.
2. Speed of cut and return instantly adjustable from operating position.
3. Table started in either direction, reversed, "inched", or stopped from pendant switch.
4. Single-Shift power rapid traverse controlled at the heads or from either end of rail.
5. Space Saver Drive, with Full Floating drive Shaft.
6. Non-Metallic Table Ways eliminate scoring.
7. Loop Lubrication. The only adequate system for high speed reciprocating tables.
8. Mechanical non-shock tool lifters.
9. Side head feed independent of rail heads.
10. Built in 24″, 30″ and 36″ sizes.

Write for fully illustrated descriptive Bulletin No. 55

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

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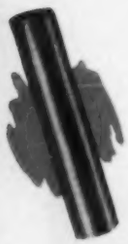
in the Die Shop

in the Press Room



DANLY PRECISION DOWEL PINS are accurate through their entire length . . . Diamond tested for hardness (58-60 Rockwell-C) . . . Ground to a tolerance of .0001".

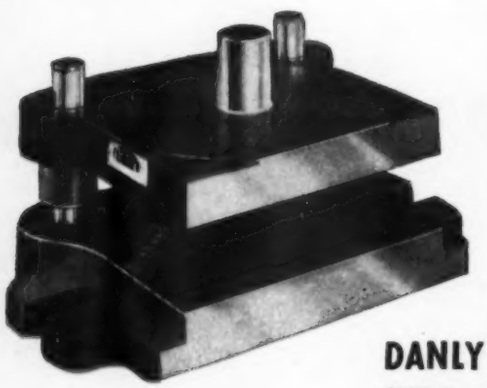
DANLY KNURLED SOCKET-HEAD CAP SCREWS save time and money. The mechanic can drive the knurled head a good part of the way before using the wrench. Infinite applications—a wide range of sizes.

Photo—Courtesy of Croname, Inc.

DANLY KWIK-KLAMP TOGGLE CLAMPS combine strong construction and simplicity of operation—used wherever quick, positive clamping action is required.

DANLY DIE SPRINGS are noted for staying power and high resistance to fatigue. Two complete lines: *Medium Pressure—High Deflection; High Pressure—Medium Deflection.*

DANLY SOCKET-HEAD STRIPPER BOLTS. Made of high-grade steel, these stripper bolts have the same knurled socket-head found in Danly Cap Screws.



DANLY DIE SETS are famed for precision and known accuracy in Die Shops and Stamping Plants everywhere. Many types and sizes in Steel, and Semi-Steel.

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American Machinist's Spot NEWS OF METALWORKING

General Motors is setting up its own standards for machine tools which differ from existing standards used in building machine tools. As part of this program it invited companies making electric control apparatus to meet with its process engineering department officials in Detroit on Nov. 11. The program is being sparked by R. L. Wilhite, R.R. Mitchell and L. A. Danse.

Designers and engineers from two large New England textile machinery companies have been discussing with metal stampers the replacement of castings by stampings for certain machine parts.

Automotive parts makers have been asked to increase monthly production of truck components one-third to one-half immediately. Truck assemblies the next six months will be very heavy.

A floating exhibition of British machine tools and precision instruments has been sent to South America by E. H. Jones (Machine Tools) Ltd., London. The working exhibit is on board the motor ship at "St. Merriel" which is calling at ports in Argentina, Brazil and Uruguay during its three-months' tour.

As third round of postwar wage increases looms, Bureau of Labor Statistics comes up with following score to date: wage rates rose 18% as result of first round, 11% in the second round. Total for two rounds is 31%, with weekly earnings up 21% despite reduced work-week. Cost of living, by contrast, increased 24% between V-J Day and last August.

Drought plus coal shortage has created such a power crisis in France that factories can work only four days a week. Power is shut off rest of the time. In Belgium U. S.-owned automobile plants are working 48-hr. week with productivity 10% above prewar.

General Motors has reverted to the practice in effect prior to 1945 of accruing depreciation on machinery and other plant equipment regardless of whether the age of any individual unit in service exceeds the estimated average useful life upon which the group rate of depreciation is based. Effect of this decision, retroactive to last January 1, is to increase provision for depreciation $7,714,048 in the first nine months of this year.

A possible clue to the nature of labor's third-round demands may be found in a novel wage increase asked by the airline mechanics' union. They want their "purchasing power" on a 40-hour week equivalent to what it was on a 48-hour week in 1942.

Two 1948 automobiles will have bumpers made of stainless-clad steel. The stainless clad will be bonded to a mild steel backing plate. It is claimed these bumpers will take a high luster and cannot rust, flake, pit or scratch to spoil the finish. Rolls-Royce used this method prewar.

Ford will move its forge operations from Dearborn, Mich., to Canton, Ohio, where it has purchased a wartime forge shop with capacity of 1 million pounds daily. Full production will begin late in 1948. Plant will employ 1000 men and Harry Howell, formerly with Girdler Corp., will be manager.

British coal miner can "pay his rent, buy his food, purchase a glass of beer and a bit of tobacco and still have a shilling left over for playing the horses" on three-days' pay, states a returning traveler. He loafs two days to avoid paying almost his entire wages as income taxes. Meanwhile British industries, including metalworking, are suffering from lack of power and heat.

About one-fourth the funds to be provided by the Marshall Plan will be used for capital equipment purchases, according to latest reliable reports.

German metalworking plants marked for dismantling for reparations purposes are mainly those making cranes, conveyors, elevators, heavy construction equipment, hoists, winches, boilers and tanks. Plants producing textile, printing and food machinery are not to be affected.

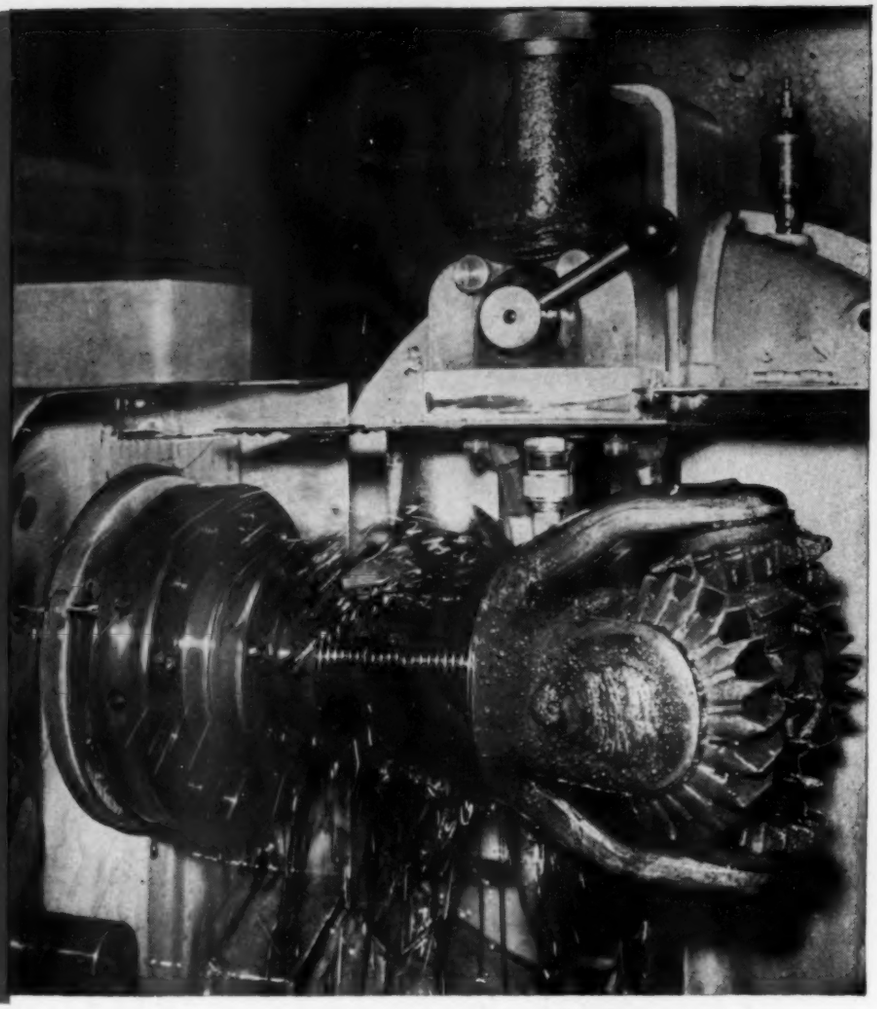
EVEN ON JOBS LIKE THIS . . .

Operation Data:

Steel #4815—Electric Weld
Diameter 4", length 5½", pitch 4
—API Special Form Tapered Thread
Time cycle 4½ minutes
Rate per hour—9
Depth of cut—.165"
RPM of work—4.8
No. of dressings—one per piece
Direction of cut—regular
No. of wheel passes—1; 3-rib wheel
Metal removed per piece—1 lb. (approx.)

Wheel Data:

Norton Abrasive Wheel No. A 80 U 9 BH
Surface speed—1 per min., 10,000 to 12,000
Wheel diameter—16 to 20"
Width—¾"



better finish · longer wheel life · lower costs

THIS thread grinding operation is a tough one, as a glance at the specifications will show you. Yet when *Texaco Grindtex Oil D* was substituted for the oil previously used, the following benefits were immediately secured –

– *Improved finish*
– *Increased wheel life*
– *Less form breakdown*
– *Decrease in oil consumption*
– *Reduction in smoke during grinding*

Because the number of plants that are grinding rather than cutting threads is increasing daily, Texaco has developed special oils to meet the special needs of this relatively new technique. Whatever your thread grinding jobs, Texaco can help you do them faster, with greater accuracy and smoother finish.

A Texaco Lubrication Engineer specializing in cutting coolants will gladly assist you. Just call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, SOLUBLE AND GRINDING OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. • See newspaper for time and station.

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Cut Your Handling Costs

If you wish to make cost-savings, examine the materials-handling situation in your plant.

"Twenty-five to thirty percent of our manufacturing expense consists of shoving materials around," according to a high official in one of the nation's largest metalworking firms.

"You can see," he continued, "how much we can reduce our costs by cutting down the movement of parts and materials."

Other production chiefs feel the same way. The manufacturing vice president of an important metalworking company confided to us recently that the place where he can make the biggest savings is in handling work in process.

"Labor is an expensive item these days," he explained. "We cannot afford to do any longer what we used to do—spend a lot of manhours lugging materials first here and then there.

"It is a wasteful practice. Costs are too high to permit it. We are studying every possible means of eliminating unnecessary handling."

A prominent midwestern company with a half-dozen plants has a special committee of production experts putting each factory in turn under its critical inspection. The main purpose is to improve efficiency. Materials-handling is one of the main factors which is being given microscopic attention by the committee.

The large number of industrial plants built since V-J Day is one of the numerous postwar surprises. Some of this new construction, to be sure, has been sparked by the need for additional capacity.

But a considerable part of it resulted from management's recognition that the new plants would pay for themselves in short order by sharp reductions in production costs.

These plants are laid out for the smooth and uninterrupted flow of materials from the time they are delivered to the factory door until they leave as fabricated products.

Trucks, conveyors and other handling devices quicken the flow. They ease the physical labor of the workmen. They increase their output per manhour.

The possibilities for improving efficiency by mechanical handling of materials are tremendous. In many metalworking shops little has been done to date to explore these possibilities.

If management will devote the attention to this phase of production that it should, it will open up new areas whereby work can be speeded, labor costs lowered and the physical effort of workers lessened.

Burnham Finney

EDITOR

*Ten-day demonstration at Machine Tool Show, C

SHOW CANES . . . A demonstration of the *Versatility* of CINCINNATI PRESS BRAKES . . .

Cincinnati Press Brakes handle so many different operations, in such a variety of work, in so many materials, and in such different quantities—only first-hand information can suggest to you the full possibilities of these machines. Our representatives and engineers will be glad to consult with you on the most profitable machine and methods for your particular needs.

Write for Cincinnati Press Brake Catalog B-2. It illustrates the many different jobs formed on standard machines as well as the many special jobs adapted to press brakes.

*Production: Six canes a minute—one at each stroke. Six operations simultaneously performed with perfect safety to the operators on this Cincinnati Press Brake.

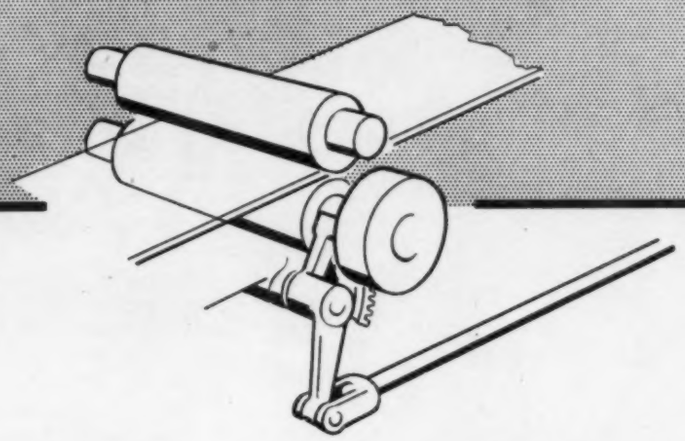
Perhaps you were in this line. Many visitors expressed their surprise at this demonstration of the versatility of Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

How to Feed Presses



EFFICIENT PRODUCTION, in the highly competitive business of metal stamping, is the keynote to successful survival. Equipment that can increase output per hour, output per man or saving in material, or all three, is bound to place the producer in a more favorable competitive position. Stamping is essentially a comparatively cheap method of producing duplicate parts. Because parts are alike, it is often possible to apply automatic equipment that will insert and eject pieces at greatly increased speeds with less operator effort, with reduced handling and, occasionally, with reduced scrap loss. This report, prepared by press engineers of E. W. Bliss Co., describes the various automatic and semi-automatic devices that can be applied to power presses, discussing the general construction of feeds as well as their limitations and possible production rates.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

Mechanical Feeds For Speed, Efficiency, Safety

INCREASED operating speed is the most obvious advantage of automatic feeds. Using the same die set, an automatic press may produce at a rate two to ten times greater than that possible by hand feeding.

Even on jobs which, because of size or shape, are limited to the manual feeding range, an automatic feed can often increase production by permitting continuous rather than intermittent operation of the press.

Press feeds can increase an operator's efficiency because they reduce effort and strain. This results in fewer relief periods. Often, too, one operator may tend several presses equipped with automatic feeds.

A third advantage in use of feeds is the increased safety for operators. Mechanical feeds keep fingers out of danger areas and safeguard operators more effectively than many so-called safety devices. Workers will remove or disconnect guards installed for their own protection, but automatic feeds make it unnecessary for operators to get into danger areas in the regular course of work.

Despite the considerable advantages of automatic feeds, press operations should not be mechanized wherever possible. Other factors must be considered. A press engineer would not select the same equipment to produce 1,000 pieces as he would for 10,000,000. Furthermore, if the 10,000,000 could be delivered over a year, the press equipment recommended would probably be different from that used to produce the same quantity in a month.

Total quantity and required rate of production are important items to be considered when choosing press equipment. All too often this information is omitted when manufacturers submit their production problems to press engineers.

A custom jewelry manufacturer, for instance, may produce no more than 200 pieces from any one die. He will need many dies for the many designs, but one hand-operated screw press will produce all the pieces needed for his market in 15 or 20 min. for each design.

On the other hand, costume jewelry for the ten-cent-store trade must be made in large quantities and, therefore, requires automatic equipment. Large quantities usually justify large initial expenditures for automatic machinery.

No matter how complicated or distorted in shape the final stampings may be, any piece may have started its journey through the press in the form of a sheet, strip or coil. Although special sheet feeds have been developed and will be described later, coil and strip stock are more widely used for high production.

As rolling technique has improved, a greater variety of material has been made available in coil form, and coils have gradually replaced strips because of handling ease and greater production possible. Both coil and strip stock can be handled by either roll or grip feeds.

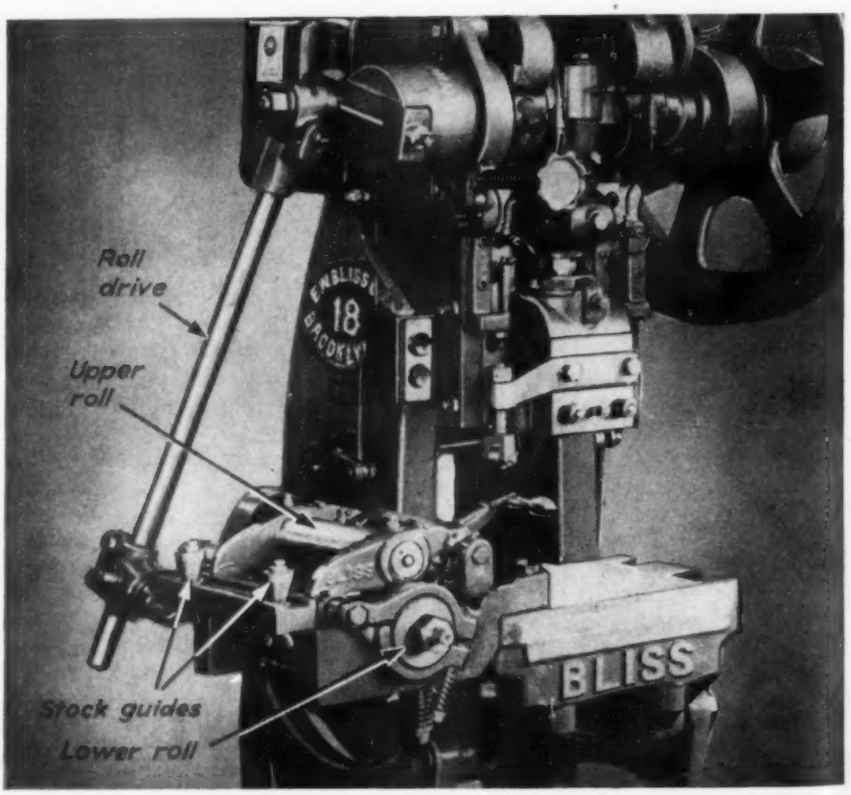
Roll Feeds

A roll feed consists essentially of a pair of rolls driven through an overrunning clutch or a ratchet mechanism and timed from the press shaft or slide. On a conventional press the feed operates intermittently so the stock is stationary while the punch touches it. The material is pinched between the rolls by spring tension exerted on the upper roll.

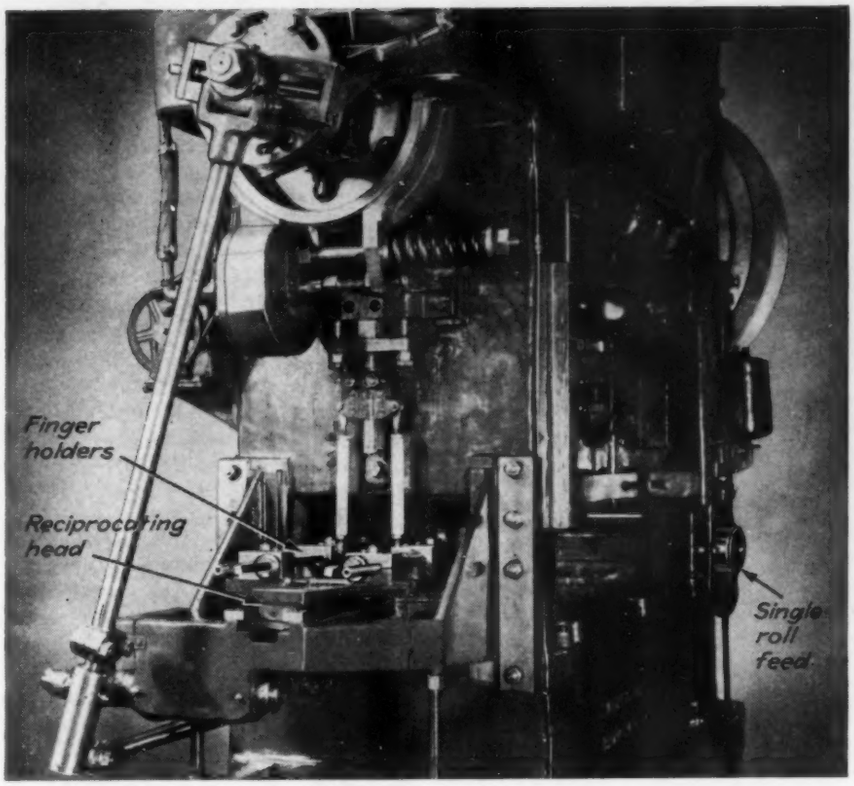
Roll feeds are made single, double and even triple, although the latter is uncommon. Single-roll feeds feed from one side of the press only and can be arranged either to push or to pull the stock across the die. For progressive dies, use of a pull feed is limited because operations must be performed in sequence.

A third-station forming operation, for instance, may require a first-station slitting operation. Such an arrangement would mean hand feeding until the scrap is caught in the feed. On plain blanking jobs where unstamped stock can be drawn across the die and inserted in the rolls, it still means the loss of blanks from the starting end.

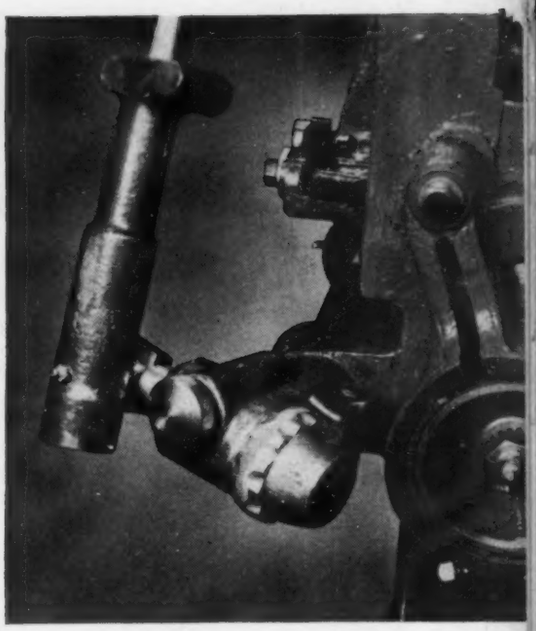
On the other hand, with a single-roll feed pushing across the die, there is no feeding action after the end of the strip or coil passes from between the incoming rolls. This means that a portion of the tail end of each strip is unused. In coil stock, this material loss is not serious because it is only



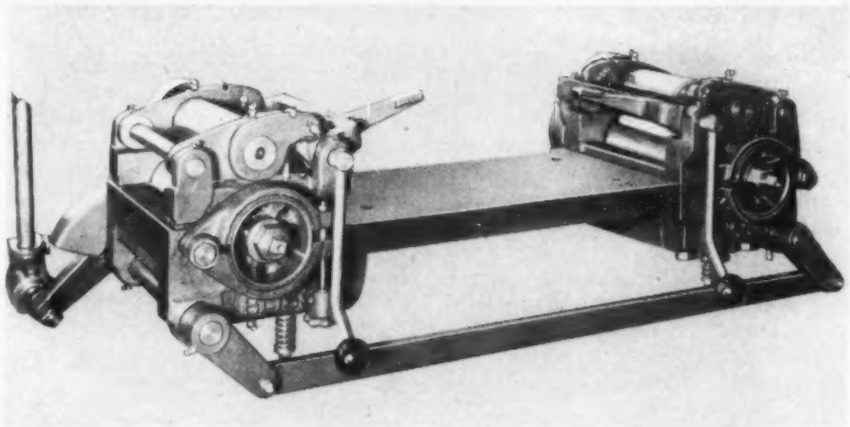
SINGLE-ROLL FEEDS *pull or push strip or coil stock across the die from one side of the press, resulting in stock loss at either starting or tail end or requiring hand feed to avoid such losses*



COMBINATION *roll and pull feed has a single-roll push feed on one side of the press and a pull feed on the other. The pull-feed fingers, mounted on a reciprocating head synchronized with the roll feed, are cam-operated and pull the tail end of stock across the die*



FLYING ADJUSTMENT *allows changing effective length of driving arm and therefore feed length while the press is running and when press speed is increased*



DOUBLE-ROLL FEEDS *with a synchronized unit at each side of the press avoid stock loss, as the push rolls provide initial feed and pull rolls feed tail end of stock*

a small percentage of the total length of the coil. But, when the stock comes in strips, perhaps 6 or 8 ft. long, such loss is considerable.

One method of avoiding loss is by using a double-roll feed, that is, two synchronized roll-feed units, one on each side of the die. With such an arrangement, scrap left after punching out the required pieces passes on through outgoing rolls, which continue to pull even when the tail end of the scrap passes through the first pair. Thus no unstamped length is left. Sometimes, however, the product requires the whole width of the stock, leaving no scrap. In such a case, of course, a double-roll feed is superflous.

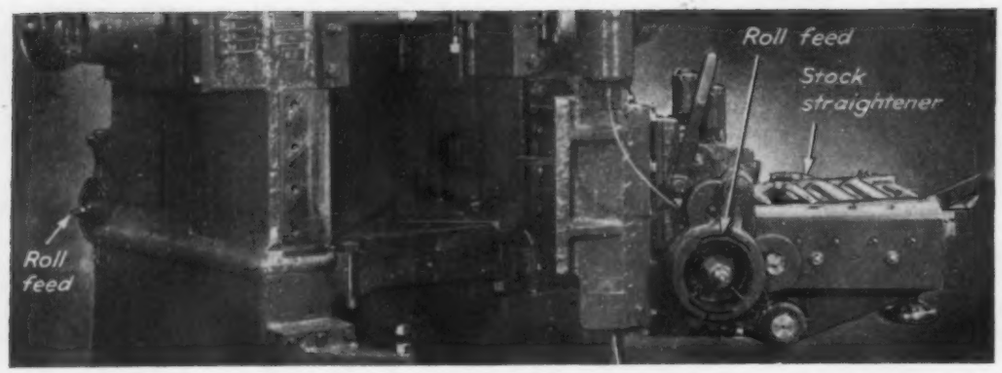
The press user is in somewhat of a dilemma if the material comes in strips and the job leaves no scrap. With a single-roll feed (pushing), the tail end of each strip must be fed by hand across the die. If the distance between feed and die is long or if feed length is short, it may be necessary to single-stroke the press 10 or more times for each strip.

One solution, applicable to jobs of this sort, is the combination roll feed and synchronized pull feed. A regular single-roll feed can be located on one side of a press, and a pull feed on the opposite side. The reciprocating head of the pull feed should move at exactly the same speed as the periphery of the feed rolls.

Attached to this head and extending into the die are two pairs of fingers, one pair each at front and back. A cam-operated mechanism opens and closes the fingers at the proper time. These fingers continue to pull the strip across the die after the tail end of the strip passes from between the incoming feed rolls, thus making the job fully automatic.

When stock is heavy enough and work shape permits, the gripping mechanism can be eliminated and fingers substituted which ride on top of the strip on the backward stroke, and drop into a hole or notch in the stock to advance it on the forward stroke.

Good engineering practice is to limit to 90° or less the motion of an oscillating lever that is driven by rod. Thus, when the feed drive rod



DOUBLE-ROLL FEEDS, *arranged to feed front to back, should have one unit mounted on a pivoted frame so it can be swung aside to permit die setting. The front feed is here equipped with a stock straightener*

is attached to a lever centered on the roll shaft itself, the feed length is limited to about 90° rotation, or ¼ of the roll circumference. For longer feeds, the drive rod can be made to actuate a countershaft which drives the roll shaft through gearing. An alternative is a rack and pinion. The ratio of the gearing determines the feed length.

Manufacturers usually standardize on three or four widths and lengths of feeds covering the general range of work. In this way they can pass on to the user the savings effected in mass production.

Roll-feed Accuracy

The accuracy of a roll feed depends on many factors: length of feed, speed of press and care in fitting. Feeds are driven by a crank motion which reaches its maximum speed at mid-stroke and then gradually slows to zero.

As their speed diminishes, inertia of the feed rolls and other revolving parts tends to make them run ahead of the drive. Such a tendency is more or less efficiently opposed by a brake applied to the roll shaft. It can be seen, therefore, that the feed is not positive. The greater the speed, the greater the tendency to override and the greater the possibility of inaccuracy.

The question, "How accurate is the feed?", is often asked. It is difficult to give an exact answer because of varying conditions. Tension on brakes (which expand on warming up), tension on feed rolls, backlash in the driving mechanism, inertia of the stock, binding in stock guides because of strip camber, lubrication of the stock itself—all these factors can affect accuracy in feeding.

Probably the most important item is the ability to start and stop the rolls quickly; this will, in turn, vary with the speed at which rolls revolve.

The maximum accurate feeding speed, expressed as pitch length of feed multiplied by strokes per minute, also varies with different feeds under the same conditions. For the usual commercial feed made in quantity and having solid rolls, 400 or 500 ipm. should be a safe figure to use. On the precision type of feed, with hollow rolls, carefully fitted bearings and oversize brakes, 1,000 ipm. may be acceptable.

Timed power brakes on the feed can raise this figure to perhaps 1,500 ipm. On special feeds having extra-light alloy rolls, anti-friction bearings and power brakes, 2,400 ipm. and even more have been obtained with a high degree of accuracy.

Sometime when long feeds, 36 in. or more, are required, elliptical gears or scotch yokes in the driving system reduce the maximum feeding speed while maintaining a fast press speed by driving the feed during, say 240° rotation of the crankshaft instead of the usual 180° period.

Most progressive dies use pilots, and the speed limits listed above should give feeding accuracy well within piloting distance.

Because the inertia of rotating feed parts tends to increase the feed length when press speed is increased, a feed length set when the press is turned over by hand is likely to be too long when the press is turned over under power. With a flying adjustment, a handwheel, located at the center of oscillation, can be turned to change the effective length of the feed driving arm and consequently the length of feed while the press is running.

On a normal press, the feed operates from the point when the slide is at mid-stroke up until the slide is at mid-stroke down. The press clutch is so arranged that the shaft stops when the slide is at top position or, in other words, at mid-feed stroke, when the feed is traveling at its maximum speed. The sudden stop often causes the rolls to override slightly. Thus, when the press is started again, this override can cause an over-long feed.

Some feeds are arranged so rolls can be held open during this half stroke until they have stopped turning, and then dropped closed automatically. In such instances the operator opens the rolls, shifts the strip to the next full feed position and trips his press without danger of a smash-up in his die because of a long starting feed.

Scrap Stretching Humps Stock

Occasionally, with soft materials there is a tendency for the punch to stretch the scrap. The material that must pass through the outgoing rolls is actually longer than that entering through the incoming rolls. If feed rolls remain perfectly synchronized, there is a gradual accumulation of stock between them in the form of a hump which can cause jams and misfeeding.

There are two ways to correct this trouble. One is to separate the outgoing rolls during the non-feeding period, allowing the stock to flatten out by itself. On many progressive die jobs, the upper rolls are lifted anyway, for piloting.

The second way to correct overfeeding employs an eccentric pin in the driving mechanism of one feed unit—usually the outgoing one. Turning this eccentric pin changes the effective length of the lever arm, giving the outgoing feed the desired increment. This method of adjustment is effective, but cannot be adapted to all types of feeds.

When a great variety of dies is to be used in a roll-feed press, an adjustable feed level is desirable. Many feeds are made so the entire unit can be adjusted up or down a distance of from about 1 in. on the smaller units to 3 or 4 in. on the larger ones.

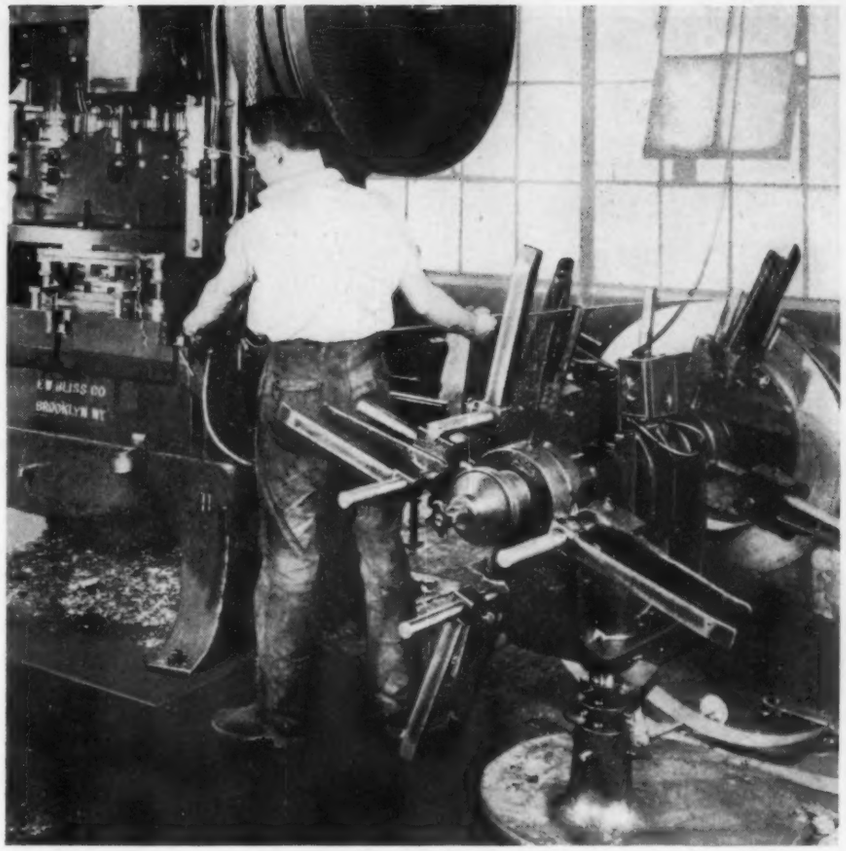
When a die is ground and returned to the press, the feed can be lowered to compensate. This adjust-

ment keeps the strip in a straight line and prevents bowing of the stock, which can cause it to bind in the guides.

When double-roll feeds are arranged to feed from front of press to back, at least one of the feed units should be mounted on a frame pivoted at one side. This arrangement permits the die to be inserted and clamped in place without difficulty.

On special-purpose presses where the feed length remains fixed, as it does in some perforating presses, feed rolls can be driven in the usual intermittent manner through a geneva motion or by an intermittent worm and follower. As feed rolls that are so driven are geared positively to the crankshaft, there can be no coasting and the need for overriding clutches and brakes is eliminated. This permits comparatively high-speed operation, which is especially desirable in perforating jobs where feed lengths are often about 1/32 in.

It is possible to arrange such a feed with change gearing. But the lengths of feed are then fixed because they are controlled by the gear ratio, and the feed is not infinitely adjustable within its range as common roll feeds are. It is therefore applicable to one job only.



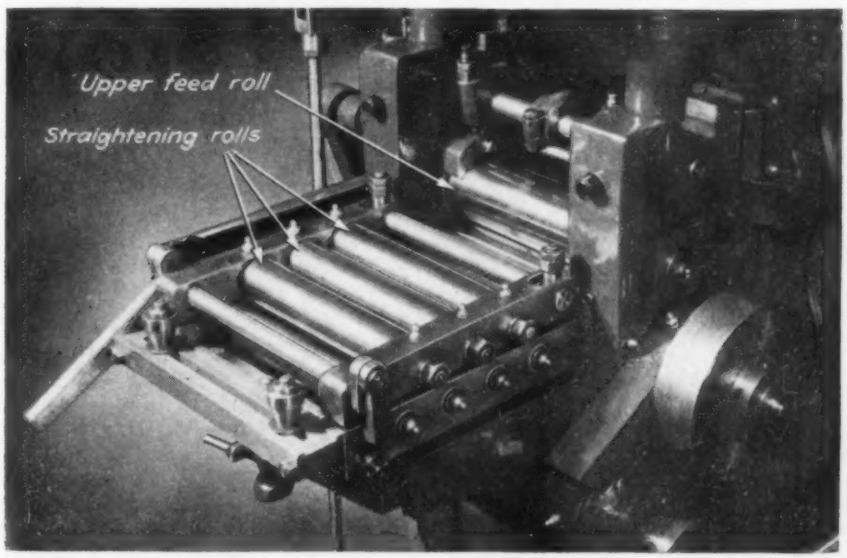
COIL HOLDERS *supply stock to automatic feeds at a uniform rate. This type is driven by an electric motor controlled by a limit switch actuated by an arm resting on the stock loop. As slack is used up, arm rises and starts motor*

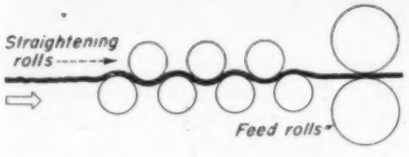
Hydraulic Roll Feeds

The automotive industry is the primary mass-production industry, and, in the interest of increased production, uses automatic roll feeds of dimensions not required in other lines. For continuous stamping of fender or door blanks, wide material and long feeds are required.

For such use, hydraulically driven roll feeds give excellent service. Their feed length is easily adjustable and can operate against stops, thus insuring a degree of accuracy. Their even acceleration and deceleration minimize slippage from inertia of the material.

This feed consists essentially of a pair of feed rolls driven by a hydraulic motor and timed from the press. As the rolls come to a halt, a limit switch is tripped and the press goes through its cycle. When the press slide reaches a predetermined position on the up stroke, another limit switch closes the circuit which starts the rolls revolving. Two roll-feed units would be difficult to synchronize; therefore the hydraulic roll feed is usually confined to a single unit.



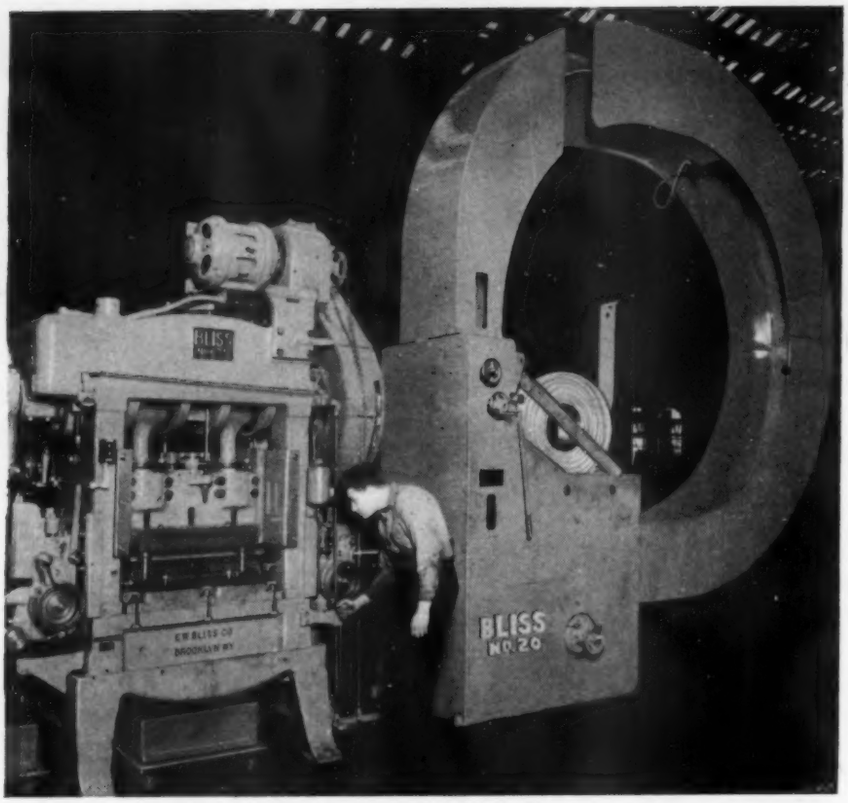


STOCK STRAIGHTENERS, *by flexing stock back and forth between upper and lower rolls, take set out of coil stock and deliver flat stock to feed rolls and dies*

Coil Holders

The function of coil-holding apparatus is to supply stock at the necessary uniform rate to an automatic feeding mechanism and to do so without interference with operation of the feed.

Inaccuracy in feeding has occasionally been traced to inertia of the stock coil. In operation, the coil



COIL CRADLE AND STRAIGHTENER, *designed to save floor space, is placed close to press, with required slack maintained in the cradle loop after stock passes through straightening unit*

coasts to a stop between feeds leaving a loop of stock between it and the incoming rolls. As the feed continues to operate, the slack grows smaller and smaller until it is used up and stock is taut.

At this point the feed must exert a terrific yank on the coil to reel off the necessary length of stock. Often the friction of the feed rolls on the stock is not sufficient to accelerate the coil quickly to top speed. Roll slippage and misfeed result.

To eliminate this trouble, it is not necessary to stop and start the coil in perfect synchronization with the intermittent motion of the roll feed. Some plants have the press operator turn the coil by hand to maintain an adequate loop.

One simple alternative is to pass the stock through a stirrup and roller, fastened by a tension spring to the floor. As stock is pulled under the roller by the feed, the loop decreases, stretching the spring. During non-feeding periods, the spring contracts, pulling the coil around to provide more slack.

The conventional method uses a coil holder driven by a small electric motor. The motor is turned on and off by either a toggle limit switch or a mercury switch, actuated by an arm lying on the stock loop. As slack is used up, the arm rises starting the motor to turn the coil. Adjustments are usually provided for controlling the amount of slack to suit feed length and speed.

For heavy coils, cradles are generally used. The coil is supported by comparatively heavy rolls, which are sometimes driven. Often a pair of driven feed rolls are added to help pull the coil around. The motor drive is controlled by a pivoted arm, similar to the arrangement for coil reels. The cradles are easily loaded, it being necessary only to roll the new coil of stock up a short incline and onto the supporting rolls or belt.

Straighteners Remove Metal Set

Metal wound up into a coil and held that way for some time usually takes a "set." This curvature is frequently objectionable when the part blanked out must be flat. Roll straighteners are designed to correct this condition.

The roll straightener is an arrangement of an odd number of steel rolls, which bend the stock back and forth as it is pulled through them. A vertical adjustment of the flexing rolls controls their inter-action in such a way as to insure delivery of flat stock to the incoming feed. For heavy stock, only five or seven rolls are needed, whereas light stock may require as many as 15 small-diameter rolls.

Stock straighteners can be mounted on the press or on a stand as a separate unit; or they can be made a part of the coil cradle. Those mounted on the press are built as an integral part of it and are driven from the roll feed. For many jobs, this location is satisfactory. But when the press is set up with progressive dies using pilots, the straightener should be separate from the press and set apart from it.

When piloting with progressive dies, feed rolls are disengaged from the stock to allow it to be shifted into exact position. As straightening rolls remain clamped to the stock at all times, they would interfere with shifting of the stock to correct for feeding inaccuracies.

Also, when stock reels are used for holding coils, a separate straightening unit is needed because most coil holders of this variety have no place to mount the rolls.

Combined coil cradle and straightening units are often the answer for heavy coils and progressive die work. Here, the support rolls and lower straightening rolls are driven by a motor controlled through the previously mentioned loop-arm and toggle-switch device.

Strip sag between straightener and press feed should not be so great as to give the material a permanent set, yet it must be sufficient to prevent stock from becoming taut during the feeding period of the press. Ordinarily, this requirement demands that the cradle be placed at considerable distance from the press. Spacing will vary, from about 4 to 12 ft. depending on length and speed of the feed, speed of straightening rolls, and thickness and temper of material being worked.

A large unit has been designed for use in shops where floor space is at a premium. The cradle can be placed close to the press and the required slack still be maintained in the loop of the cradle. The coil rides on two driven support rolls. Stock goes through the straightening unit, up around the large loop, down under the support rolls and straightener, and out to the press.

Speed of straightening rolls should be slightly greater than maximum feeding speed used on the press. It is desirable to keep the two speeds

as close as possible to prevent fluctuations of the loop. To provide for such a condition, both cradle and straightener can be driven by a variable speed unit, adjustable for each change in press speed and feed length.

Grip Feeds

Grip feeds ofen replace roll feeds for coil stock. They are used only as single units, because it has been found impractical to hook two of these feed units together as often done with roll feeds. Grip feeds, therefore, are subject to the same limitations that govern single-roll feeds.

A grip feed consists essentially of a reciprocating head carrying a gripper shoe that clamps the stock tight on its forward movement and releases it on the backward stroke. A similar shoe, under spring tension and fastened to the stationary part of the feed, holds the stock motionless during the return stroke of the head. The feed is driven from the conventional adjustable throw-block, and movement of the head determines length of feed.

Stops can be introduced at either end of the feed to limit travel of the head. Fine adjustment of these stops permits a fine feed adjustment and, some users assert, maintains an accuracy greater than that of the roll feed.

Both roll feeds and this grip feed have moving parts which cannot easily be balanced. These unbalanced forces are negligible until comparatively high speeds are reached. At 700 or 800 strokes per min., serious vibration may be introduced by reciprocating feed parts.

A small grip feed has been designed which minimizes such action. It is driven by a vertical shaft geared to the crankshaft, A round plate, keyed to the lower end of the shaft, carries a roller which drives the gripping shoe back and forth. Adjustment of the roller controls the feed length.

This feed has operated at 1,100 strokes per min. on a 7/16-in. feed length with a maximum variation of 0.002 in. Such a feed must be built as an integral part of the press, and its chief value lies in its ability to operate accurately on short feed lengths at extremely high speeds.

It might be well to make some mention here of scrap cutters which often are an integral part of roll feeds. They are simply two blades, adequately supported, which chop up the scrap as it comes from between the outgoing rolls. Some shops find it more convenient to handle scrap cut into small pieces, while others prefer to roll it up again into coil form.

Feed length sometimes is so short that the tiny bits of scrap are hard to take care of. In such cases, an intermittently acting shear can be used for scrap cutting. A gag driven by a ratchet or solenoid mechanism operates the shear only after a predetermined number of strokes of the press slide. In this way, the scrap will be cut off in lengths suitable for handling, stacking and remelting.

A special shear has actually been used to cut the finished product to proper length. The press on which this shear was mounted formed burred holes in aluminum strip for radiator fins. The finished strip ran through the outgoing feed rolls and was cut to length by the shear.

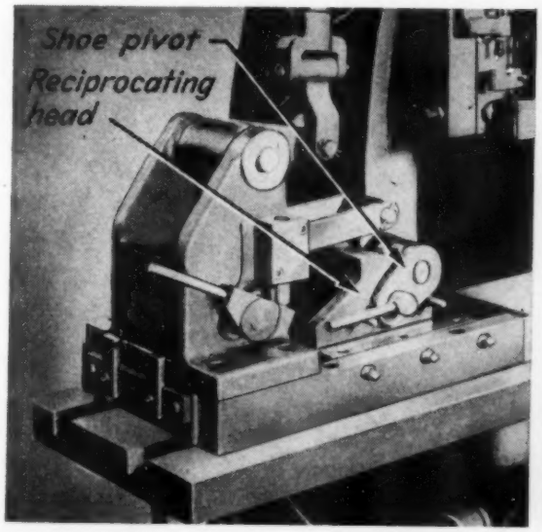
The shear was driven through a ratchet mechanism which could easily be arranged to actuate the shear after any predtermined number of strokes of the slide. Thus, the finished radiator fin could be produced with burred holes to suit any number of tubes. It was necessary, however, to have the shear knives adjustable laterally so they could be set for an even pitch length from the die to cut exactly midway between two holes.

Dial Feeds

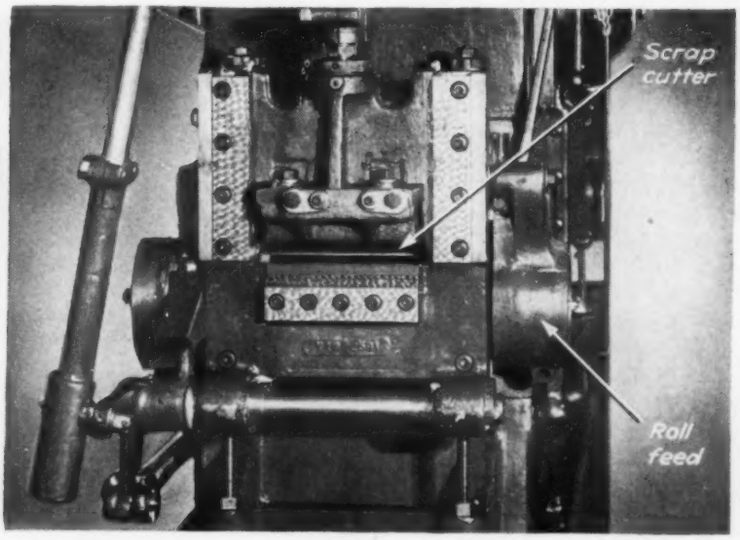
Dial feeds, and most of the feeds described hereafter, are for secondary operations, that is, they are used with pieces that have previously been blanked, formed or cut off.

They can be divided into two general classifications—ratchet or worm driven and friction driven. The ratchet-driven feed consists of a dial mechanism driven from the crankshaft and indexing, usually 8, 10 or 12 times, to make a complete revolution.

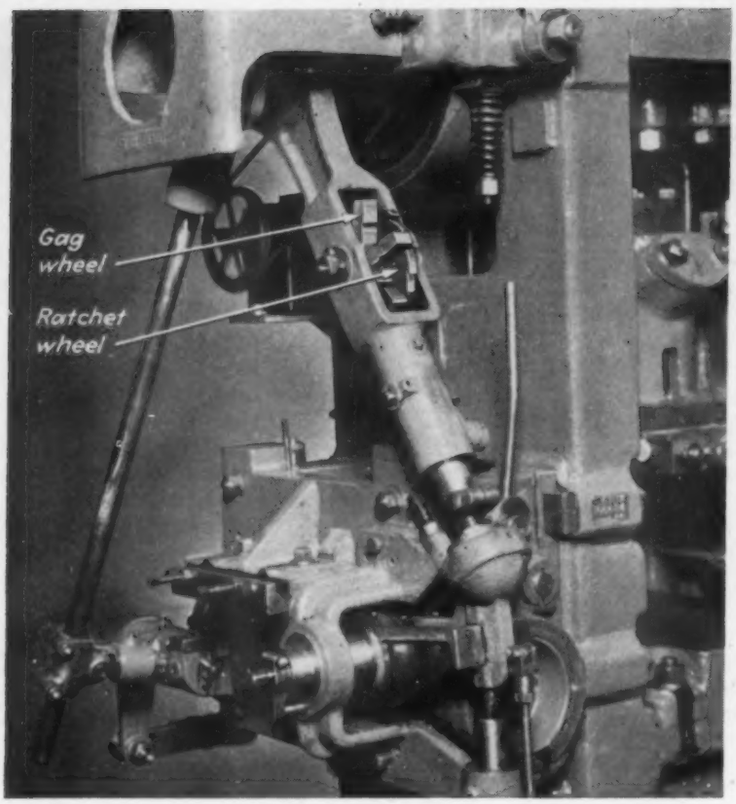
A corresponding number of holes are bored in the dial. Whenever the dial stops, the centerline of a hole is directly under the centerline of the slide. These holes are fitted with bushings or posts shaped to fit the

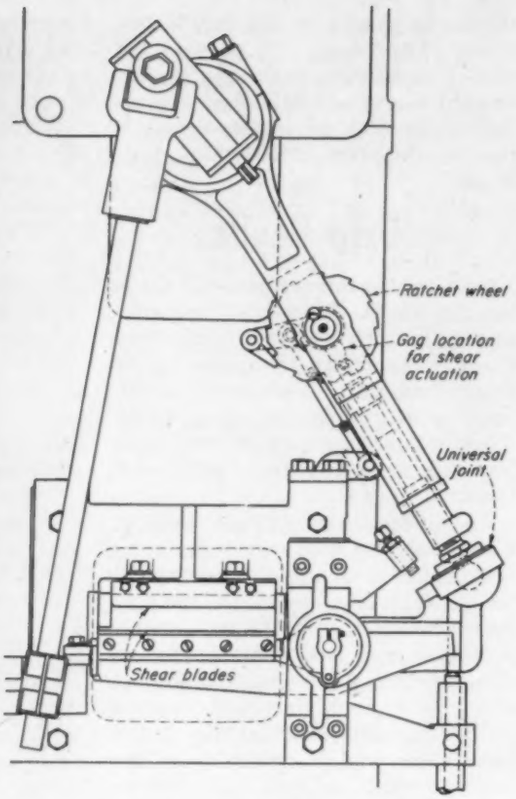


GRIP FEEDS *consist of a reciprocating head in which is pivoted a gripper shoe. As head moves forward, shoe swings on its pivot to grip stock and move it forward*



SCRAP CUTTERS, *mounted next to outgoing roll feed, have two blades to cut up scrap into sizes more easily handled than coil lengths*





INTERMITTENT ALLIGATOR SHEAR *for cutting formed pieces to length has a ratchet mechanism to operate shear after a predetermined number of strokes. Feed-rod motion is transmitted to lower part of rod only when one of five gags on gag wheel lines up with rod. The gag wheel is rotated by a ratchet wheel also carried in the rod but operated by a pawl fastened to the side of the press. Details are sketched above*

piece being pressed in the machine.

A straight-walled cup, for instance, is to have a hole pierced in the bottom. The operator places the cup in the dial bushing. The dial rotates, carrying the cup under the slide where the hole is pierced. The cup is carried on to another position clear of the slide and having a large hole underneath through which the pierced cup drops.

If the cup has a flange, it cannot drop through, but must be plucked from the top of the dial. A cam lift-out can easily be arranged to lift the shell out of the bushing, where either an operator or a mechanical finger can eject it. A timed air blast sometimes aids in removing the piece from the die.

Among the many limitations of a dial feed is its speed. A worm-driven dial can run at a hundred or more strokes per minute, but it is impossible for an operator to load the dial at such a speed. Loading rate depends on work shape, the ease with which they can be centered in the bushing and the skill of the operator.

Under normal conditions, a production of 40 to 60 pieces per minute can be expected. But when a non-geared press is slowed down to such an extent, it loses much of its flywheel energy. For this reason, it is common practice with dial feeds to select a backgeared press which normally runs at slower speeds.

By locating the tools at 2, 3 or even 4 dial stations, several operations may be performed in the same machine. Operations should be balanced so the force on the slide will not be too far off center. Where this balance is not possible, a double-crank press can be used because it can withstand a moderate amount of eccentric loading.

If the operation changes the outside shape or size of the piece, however, it will not thereafter fit tightly in the bushing and consequently will not be properly located when moved to the next station. Similarly, a coining or swaging operation usually cannot be performed in a dial feed, because the pressure will cause the metal to spread and jam in the bushing too tightly to be easily removed.

A dial feed would appear to be ideal for shaving or broaching operation. For external work, the piece could be pushed on through the die. For internal work, such as broaching a hexagonal socket in a screw head, the operation seems simple. The trouble lies in getting rid of shavings and splinters.

Some lubricant is usually used and inevitably the scrap sticks to everything, wedging under the dial and causing the mechanism to score and jam. It is strongly recommended, therefore, not to use automatic feeds, particularly dials, in broaching and shaving operations.

On certain jobs, dial bushings or posts are themselves the dies and must be accurately aligned with the punch in each position. Dial feeds are not produced commercially that will maintain such a high degree of accuracy, but the die bushing can be allowed to float slightly. A pilot pin in the die can be arranged to fit closely into a bushing on the punch to pull the tool into perfect alignment.

Stop Prevents Improper Indexing

Occasionally, for one reason or another, a dial will jam midway between stations. On many jobs this means a broken tool. To prevent such trouble, a cam-operated dial feed can be fitted with a block, known as a register locating stop,

that is actuated by a cam on the crankshaft and slides into a notch cut in the periphery of the dial. If, because of improper indexing of the dial, the sliding block fails to drop into place, a special lever disengages the clutch and stops the press before the slide reaches bottom of the stroke.

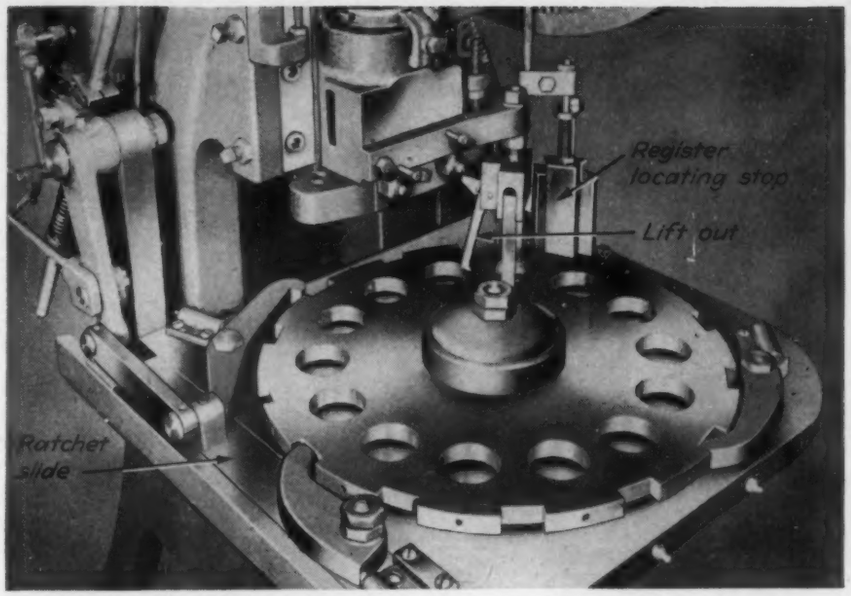
The slide stroke of a press fitted with a ratchet dial feed should be equal to twice the distance the punch enters the dial bushing and die, plus about ¼ in. for clearance. On certain jobs this figure can be reduced somewhat. Also, a dial driven by a cam can be moved more quickly than one driven by a regular crank motion, thus permitting shorter press strokes.

A press equipped with a sliding block, however, must have a stroke somewhat longer than usual to give enough time to stop the press before bottom stroke. When close clearances are involved, the minimum press stroke should be determined by carefully checking the die, shell and bushing dimensions against the timing chart which shows the dial-feed movement.

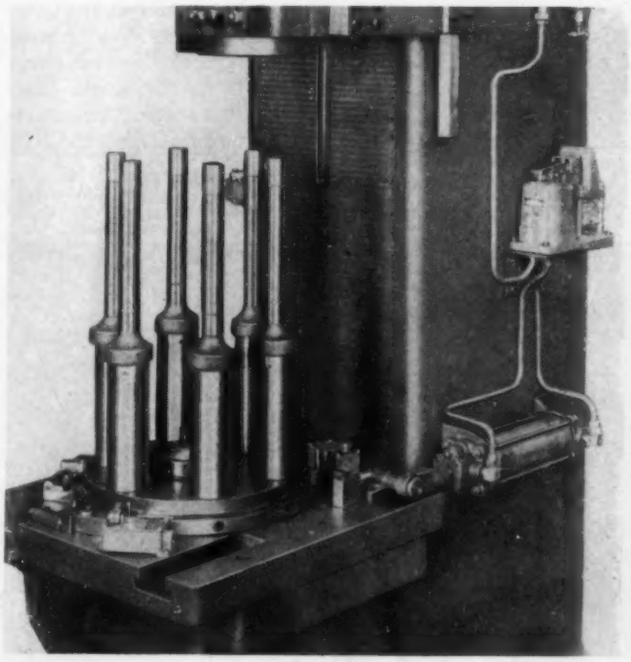
Occasionally pieces being stamped are too heavy for an operator to lift easily. In such instances, a dial feed can be used to rotate the piece into the tools after having been set in position on the dial by a hoist.

Also, use of a dial feed can reduce the length of stroke necessary in a press. During the war, for instance, it was necessary to stamp numbers on one end of long cartridge cases. If the pieces were to be set into a press by hand, the stroke would have to be somewhat greater than shell length because the punch had to be high enough at top position to permit the shell to be lifted off the post without interference. By using a dial feed, the stroke was made only ½ in. because the shell was loaded over the post outside the area of the punch.

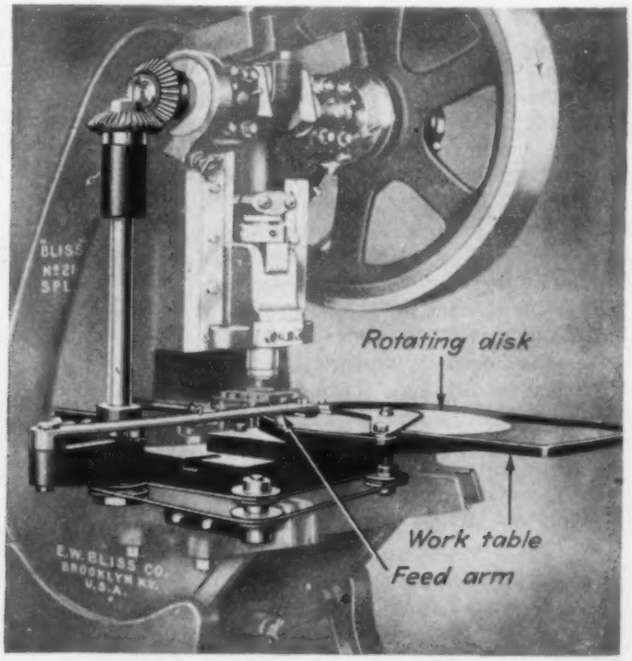
Specially adapted dial feeds can be useful in assembly operations. Two or more operators can be placed around a dial to load different components in preparation for the



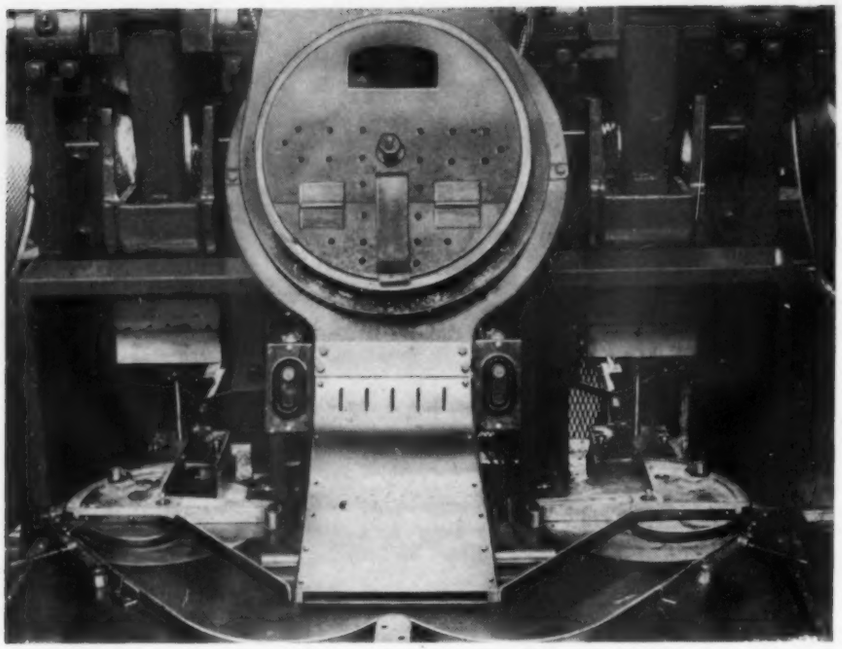
RATCHET-DRIVEN DIAL FEED *has bored holes corresponding to indexing notches so each hole is brought directly under press-slide centerline. A register locating stop prevents press operation when feed indexes improperly*



DIAL FEEDS *can reduce length of stroke necessary, as in this setup for stamping numbers on ends of cartridge cases, by allowing loading and unloading outside of press area. This dial is hydraulically driven on a hydraulic press*



FRICTION DIAL FEED *has a continuously rotating disk and a feed arm that carries shells into die. No shell location in a bushing is necessary as in a dial feed, so operation is faster*



WORK DELIVERY *to friction dial feeds can be made by hoppers and chutes to avoid costly handling. This chute delivers parts to two dial feeds set up for two separate dies*

clinching operation to be done in the press.

Friction Dial Feeds

A friction dial feed is one in which a continuously rotating disk, set flush in a flat table, carries shells between stationary guides into a die or to a reciprocating arm or fingers which, in turn, carry the piece into the die. These feeds are often used for redrawing operation wherein a shell previously blanked and cupped is reduced in diameter in a redrawing die.

Its operation is faster than the ratchet dial feed because the operator does not have to locate the shell in bushing. He merely sees that all shells are right side up as he pushes them from the table onto the revolving dial. Tapered guides and an escapement mechanism combine to insure feeding only a single shell at a time. The speed may range up to 125 strokes per min., depending on details of feed.

Ejection by Lifting

On some operations a swinging arm, which recedes just enough to permit one shell to slide in front of it, moves the piece into the die nest and holds it in position until the punch has reached it. Such a device is usually applied to push-through operations in which the shell is pushed through the die.

When the shell is tapered, flanged or is having the bottom stamped, it must be pushed up out of the die for ejection. On such jobs, the dial carries the shell into a pair of gripping fingers that transfer it to the die. A second pair of fingers, connected to the first pair, remove the finished shell and release it behind the press.

Friction dial feeds are often used to introduce previously drawn shells into a multiple-slide press. The dial carries the shell into the first of a series of gripping fingers that transfer it across the press from station to station for the necessary operations.

Friction dial feeds can be fed by hoppers and chutes, as can ratchet dial feeds. Occasionally, conveyors can be arranged to carry the shell from the blanking and cupping press to the dial-feed press.

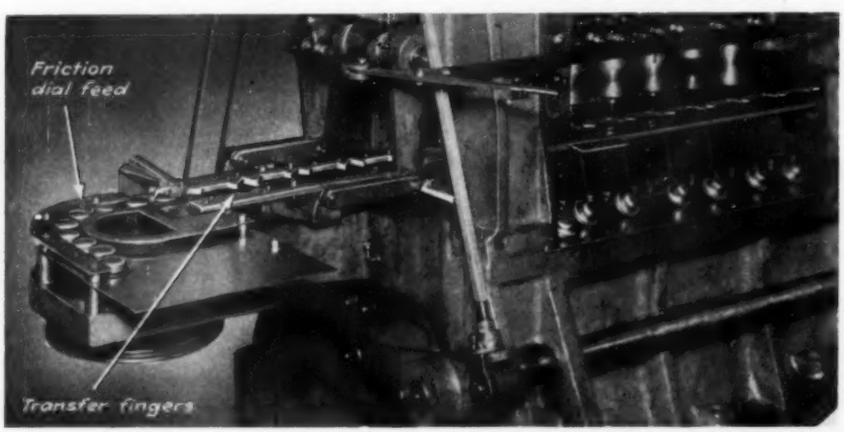
Magazine Feeds

A magazine feed stacks blanks one atop the other and feeds them singly from the bottom of the stack by a reciprocating slide. Although it is possible to feed previously formed pieces from a magazine feed, there is danger of nesting wherein one formed piece slides down slightly inside the one below it, thus locking the parts together. Pieces having rounded edges can be wedged apart by mechanical fingers that act as an escapement mechanism to permit only one part to fall at a time.

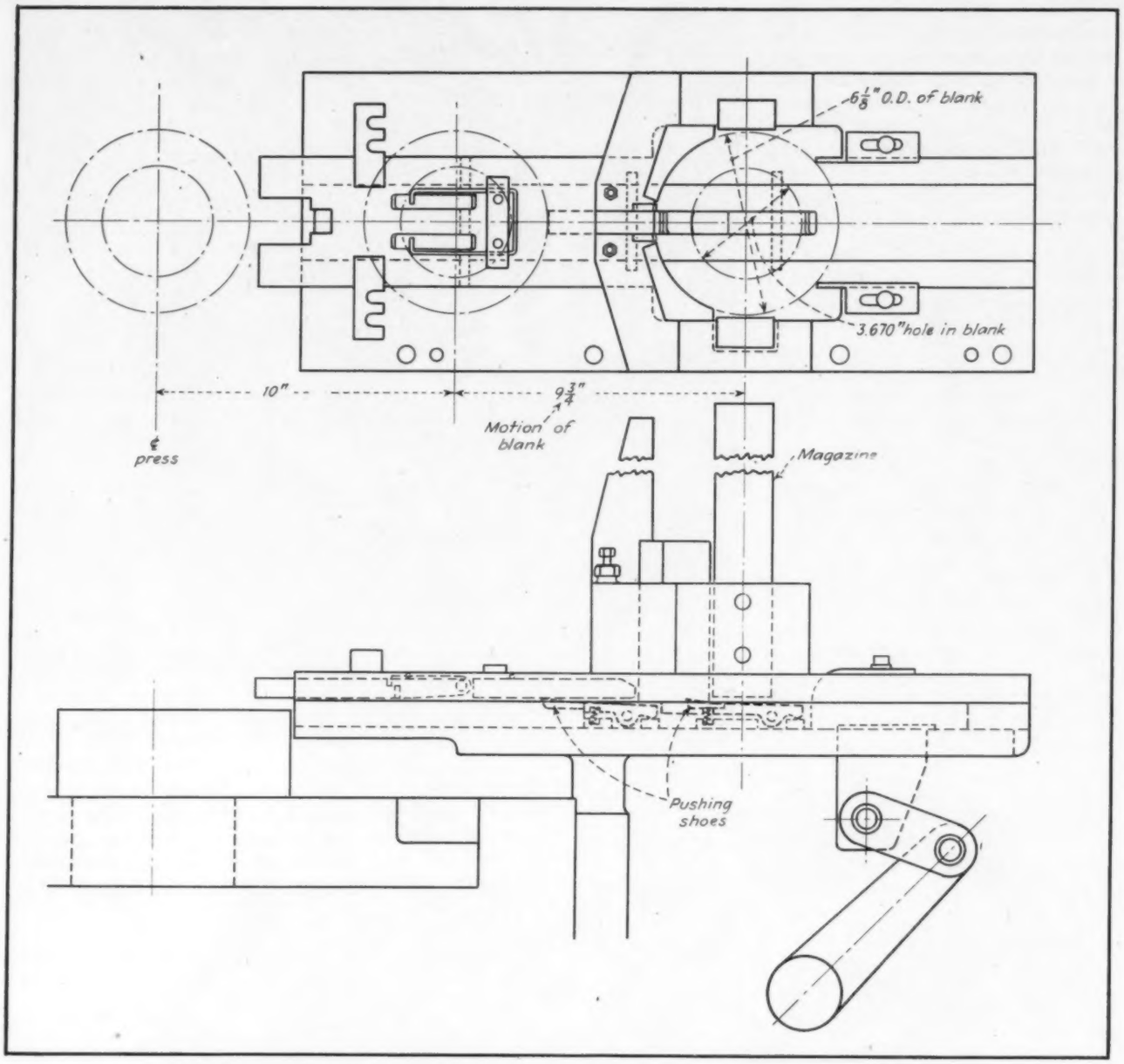
But for the most part, magazine feeding is confined to flat blanks. Thick blanks are comparatively easy to cut from under a stack. Magazine feeding of thin material requires a much more carefully fitted pushing shoe to avoid feeding doubles, causing jams and smashing dies. Disks and rings for motor laminations made of 0.025-in. steel have been fed successfully from magazines.

Can Bodymakers

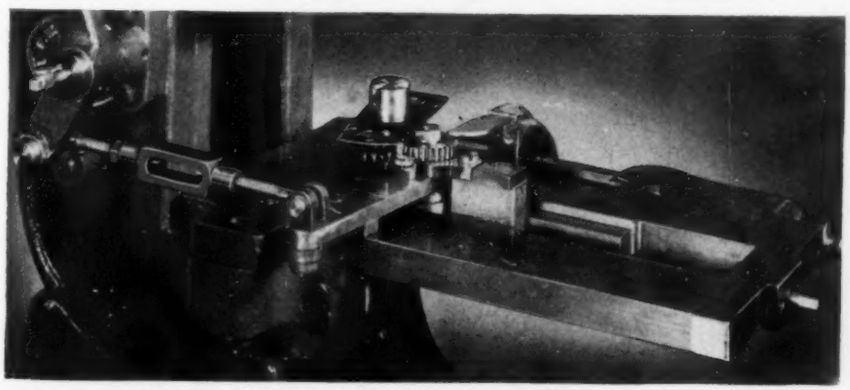
In can bodymakers, rectangles of sheet 0.012-in. thick are fed from magazines. In the latter case, however, a suction finger moves up from underneath, pulling the bottom blank slightly away from the stack. This permits two reciprocating fingers to slide between the blank and the bot-



TRANSFER-FEED PRESS *is equipped with a friction dial feed to carry cups into the first of a series of gripping fingers that, by a combination of motions, transfer them progressively through various die stations. Transfer feed reduces labor costs but may increase material costs*



MAGAZINE FEEDS, *mostly confined to flat blanks, have the blanks stacked in a magazine and feed them singly off the bottom. The reciprocating slide carries two pushing shoes, one to feed a blank on its I.D. from magazine to die and the second, contacting O.D. of previous blank, to eject it from die. Both shoes work simultaneously. A springloaded stop locates fed blank and holds it when slide is retracted*



NOTCHING PRESS *for single-die action is arranged with a master ratchet, having as many teeth as there are slots in finished motor lamination disk. This ratchet insures proper spacing of disk slots*

tom of the stack to prevent the feeding of more than one blank at a time.

Often when round blanks are fed, they are stacked in tubes, frequently during the previous blanking operation. A charged tube is then set in position in the feed. When one tube is exhausted, another is substituted.

Magazine feeds can be attached to the side or to the front of a press. They work satisfactorily when fastened on a press that is set in the inclined position.

Inertia of the part being fed sometimes causes a limitation on the speed. On heavy pieces there may

be a tendency to shoot ahead of the driving shoe, thus causing some inaccuracy of location in the die. But for the ordinary run of parts, speeds up to 175 pieces per min. may be used. The operator merely keeps the magazine filled.

Step Feeding

Usually the magazine cannot be located close to the die. This could mean a long motion of the feed arm, with a consequent loss of speed through inertia. To eliminate this problem, a two- there-, or four-step feed is employed so the motion of the feed table is little more than the diameter of the blank.

This operates by a second finger picking up the blank on the return stroke of the arm and carrying it forward to a second position, a third feed finger doing the same thing and sometimes a fourth, depending on the distance from feed to die.

Magazine feeds are sometimes mounted on multiple-slide presses, as are the friction dial feeds. Instead of a shell being fed, however, a disk is cut from the bottom of the stack and pushed into the transfer fingers.

Transfer Feeds

When a piece requires several stamping operations, there are three ways, in general, to complete it. One is to do each operation in separate presses, with or without automatic feeds. Second, progressive dies can be used, keeping the piece in the strip, with roll feeds advancing the strip across the various positions. Both the single automatic press and follow dies will reduce the direct labor costs greatly.

But many stampings, because of shape and operations required, are not readily adaptable to progressive-die operations. Often such jobs can be done in a transfer-feed press. Material is introduced into the press in strip form by roll feed, as a blank from a stack or as a cup by a friction dial feed.

It is then carried progressively to the various positions by fingers which grip, advance, recede and return for the next shell. Although the outside surface of the piece is reshaped in each die, the individual gripping fingers can be shaped to fit.

On some machines where the shell maintains a uniform shape throughout, gripping fingers may be arranged on springs to eliminate the need for a gripping movement in the feed itself.

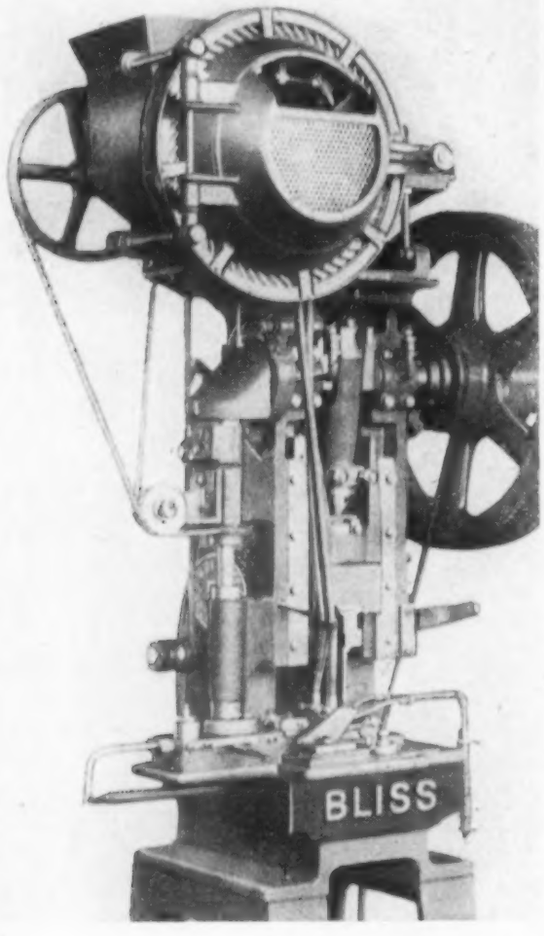
There may be some question of why anyone would prefer to blank and cup a shell in another press when a transfer-feed press can be equipped with a roll feed to take the material from the coil. There are several reasons. First, greater scrap economy can usually be effected by blanking two or more disks per stroke from a single width.

Second, annealing is often necessary between operations. A steel shell can stand just so much cold working before it cracks. Obviously, a shell cannot be removed from the third or fourth operation in a continuously operating transfer press and, after annealing, be reintroduced to the machine for subsequent operations.

But if the shell is blanked and drawn in a separate press and, after annealing, fed into the transfer press, the shell is usually soft enough to carry through the rest of the operations without exceeding the strain-hardening limits of the material.

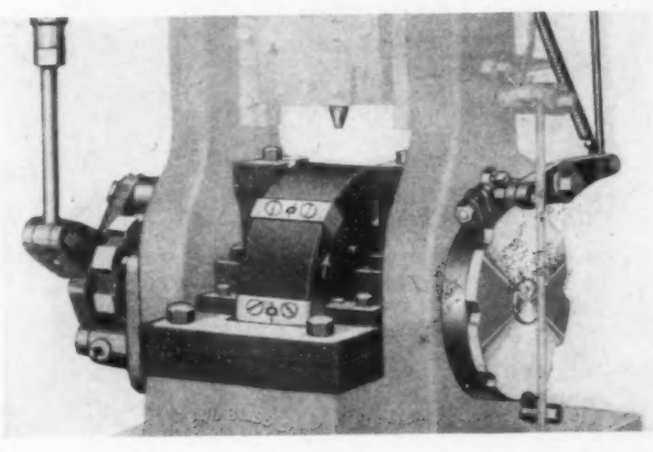
A third reason for using a separate press for the primary operation is that a narrower transfer press is needed. The center distance between stations is usually determined by the maximum diameter of the piece. As the blank is always larger than the cup, the press which has the blank for the first operation is bound to be wider than the one with the cup for the first operation.

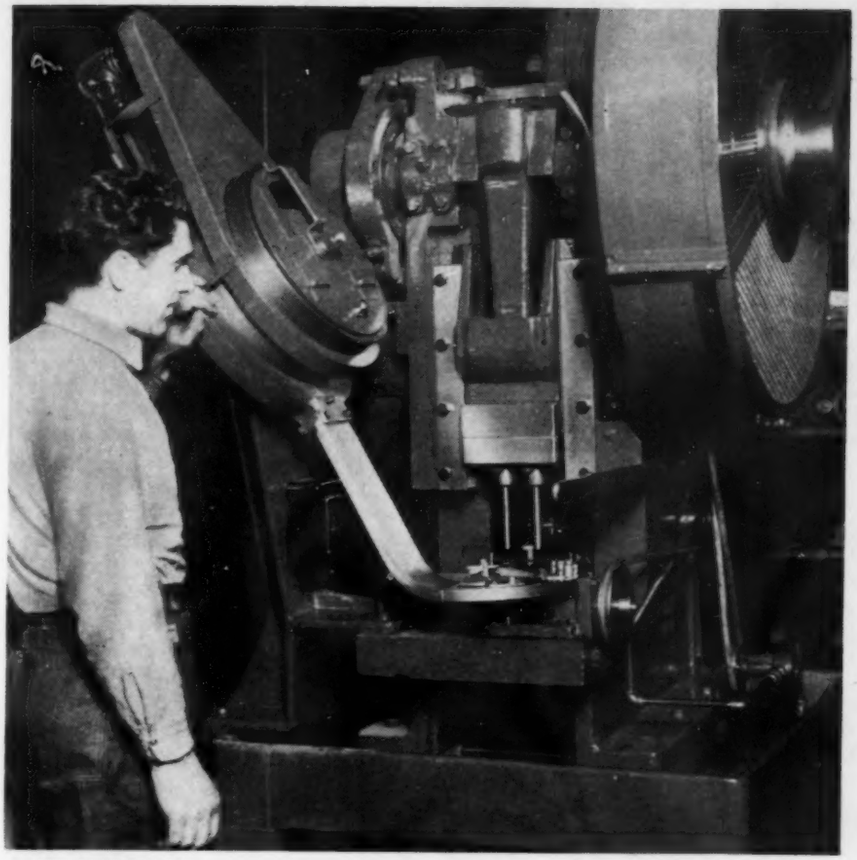
Transfer feeds can be adapted to both single- and double-action



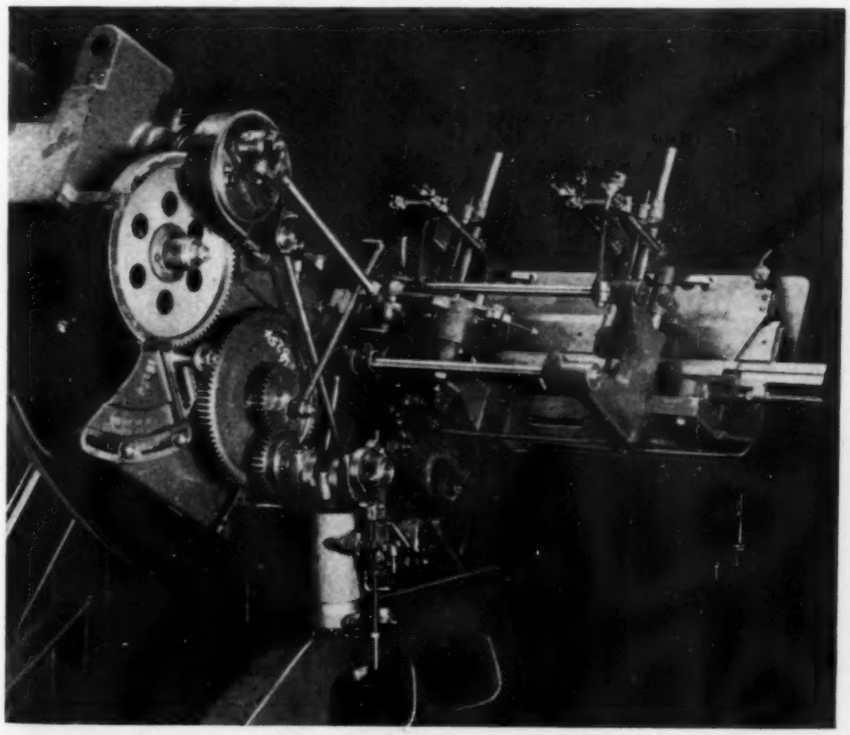
PIN HOPPERS *are employed for feeding small redrawn shells. Interior pins pick up shells and carry them to hopper top where they slide into tubes leading to die*

DRUM FEEDS, *arranged with a rotating drum set on edge to carry parts under the die, are useful for feeding and ejecting fairly long pieces. This drum feeds bolt heads under a trimming die*





GATE HOPPERS *have openings cut in a rotating cylinder that let only one properly placed piece through into chute leading to dial feed in this case. Rotation of cylinder tumbles workpieces until they come into proper position for entering chute*



STRIP-FEED PRESS *stacks sheets on edge and feeds top one forward by suction fingers that lift it, cross-feed arms that pull it back against a gage and a reciprocating feed bar, with fingers, that advances it*

presses, and are used occasionally with other feeds—roll, hopper or magazine which introduce auxiliary material at the proper station. One outstanding example was a press built for assembling 0.50-caliber cartridges. Previously drawn shells were hopper-fed into the first position, and two other hoppers fed components into them during their travel across 12 stations.

Notching Presses

Notching presses are used for punching radial slots, notches or holes around the periphery of a disk or ring. When part quantities are comparatively small, it is cheaper to make a single die to cut one notch per stroke than a complex tool for cutting all the notches at once. Also a smaller press will do the job.

Notching presses use a special adaptation of the ratchet dial feed.

A master ratchet, having the same number of teeth as the finished disk or ring, is keyed to the lower end of an indexing spindle. The blank is clamped to a plate at the top, and the press set in motion. When the spindle has completed a revolution, the press stops automatically.

Notching presses run from 150 to 600 strokes per min., depending on the construction. To obtain matching disks, a high degree of accuracy must be maintained in the feed.

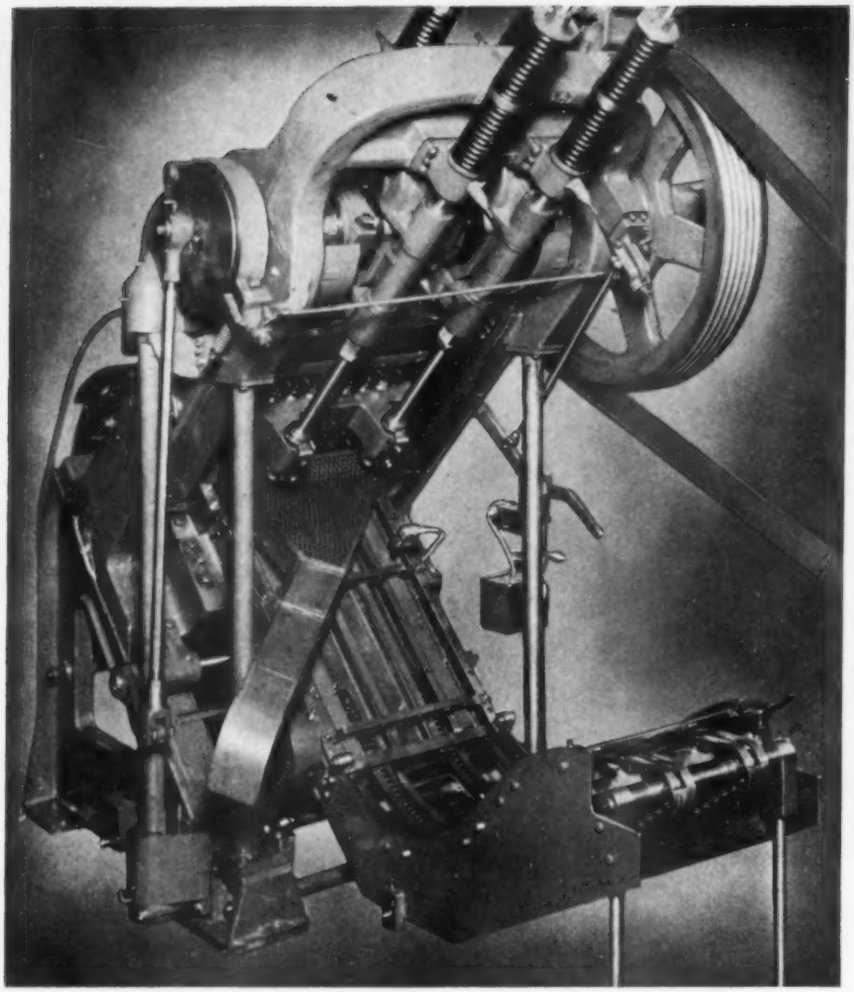
Indexing Feeds

In another special adaptation of a dial feed, the dial, in effect, is set up on edge and rotated in a vertical plane. This type, designated a drum feed, is useful for feeding and ejecting fairly long pieces. Accuracy of location is effected by two pilot pins in the press slide that enter bushings in each die plate as the drum is indexed.

Other feeds, which rotate in a similar manner, are adapted to punching, notching, perforating or stamping operations that are equally spaced on cylindrical or conical shells. Usually these feeds require special engineering to suit the particular job.

Hopper Feeds

Hopper feeds are automatic materials-handling devices which take identical pieces, dumped helter-skelter into a receptacle, and feed them, one at a time, in correct position into



SHEET FEEDS *handle whole rectangular sheets of stock. This one feeds stock into press by a series of pawls on feed bars that reciprocate as press operates. Pawl spacing must equal pitch length desired*

a tube or chute leading to the die. Parts are usually agitated in the hopper and tumble about until they fall in the right position to be picked up or passed through a gate in a barrier.

Any slight irregularities in stamped parts often present a problem because of danger of jamming and mis-feeding. Development costs for such feeds are relatively high, and each job presents a problem peculiar to itself.

One of the more common of these feeds is the pin hopper, used for feeding small redrawn shells. It consists of a ring or series of rings with pins projecting inward toward the centers, but offset at an angle from radial lines.

As the rings rotate through a pile of shells, some of the shells are picked up on the pins and are carried to the top where they slide off into a chute or tube leading to the tools. The pins, of such diameter that a shell can easily slide over them, must be spaced so shells cannot get caught between them. Two or more rings can be used, depending on how many dies are to be fed simultaneously.

Another type of feed, for similar shells, has a V-shaped trough with a moving belt at the bottom. When shells reach the end, they encounter a protruding finger on the axis of the tube. Shells traveling closed-end first drop past the finger and into a chute, but shells moving open-end first stay horizontal longer, catch on the finger and are turned over, to drop into the chute in the correct position.

A gate hopper has openings cut in a cylinder of such size as to let only one properly oriented piece through into a trough or chute. As the hopper rotates, pieces tumble about until they are in proper position to slide through the gate. Such hoppers can feed first-operation shells when the diameter is greater than the height.

Still another type of hopper is adapted to feeding coin-shaped slugs. Usually it makes no difference which way the slug is delivered to the die, so the function of the hopper is merely to feed a single slug at a time.

Other types of hopper feeds with ingenious motions have been developed to suit different cases. With all of them it is necessary to experiment before uniform and reliable feeding is obtained. The chief advantage of hopper feeds is that pieces can be dumped into hoppers without previous handling or stacking to get them in proper position for introduction to the die.

Strip Feeds

Tin plate for sanitary cans is not yet readily available in coil form. As sheets of tin plate in current use are awkward to handle in an automatic-feed press, general practice is to slit sheets into strips of suitable width and stack them in a strip-feed press for stamping can tops and bottoms.

The top strip in the stack is lifted by suction fingers. Crossfeed arms pull it back against a gage and under a reciprocating feed bar, which has fingers, properly spaced, to advance it across the die. After the strip is completely punched, a cam-operated kicker catches the scrap and throws it clear of the press. The action is entirely automatic, and both suction fingers and crossfeed are carefully timed with the feed bar.

Change gears are available for various size blanks. Microswitches in the feed mechanism are arranged to stop the press automatically if two strips are pulled under the feed bar. Other switches detect jams in the feed or die. The strip-feed press operator merely keeps the stack of strips filled, and the machine will stamp out parts continuously at speeds from 100 to 200 strokes per min.

A speical application of the strip-feed press is the card-cutting press that blanks ordinary playing cards. Strips, on which are printed the different markings, are stacked on the table of the machine.

An arm pulls these strips one at a time under a reciprocating feed bar, which pushes them across the blanking die. Continuously revolving rolls at the right of the machine are permitted to come together on the scrap, when the cards are all punched out, to whisk it out of the way of the next

strip. Blanked cards are stacked in a chute under the die bed.

It is obvious that markings must be centrally located in the blanked card. Uneven markings have often tipped off a card player as to the cards held by an opponent.

To accomplish the perfect registry needed, a slit is made in the strip between each card by the printing press when printing the markings. These same slits are used by the feed-bar fingers in pushing the strip across the die to insure proper positioning therein.

Die Slides

A die slide is a gibbed plate to which a die can be fastened and which is moved into position in the press by hand, mechanically or by air when the die is loaded. The slide is timed to stand still while the ram is descending and then to move out toward the operator, who removes the stamped part.

A die slide is normally in the *out* position where the blank is hand fed into the die. The operator depresses the press pedal and holds it until the clutch is tripped. As the pedal is pressed down, the operating lever moves back, releasing a snap lock switch that closes the circuit to one solenoid air valve and opens the circuit to a second solenoid air valve. While the second valve exhausts, the first lets air pressure into cylinder, forcing the piston and attached die slide to the *in* position.

The operating lever also hits a plunger and is stopped momentarily so the press clutch cannot be tripped, unless the slide is back in its extreme *in* position. As the slide nears its *in* position, it engages a slotted latch and pushes it out. The plunger is cut down so its stem passes over the latch, and has been squared off, with clearance, to engage latch slot.

Unless the latch is pushed in far enough by the slide, the square on the plunger will not engage with the slot on the latch and the plunger will not move, thus preventing the clutch from being tripped. When the plunger is properly engaged with the latch, the operating lever moves far enough to trip the clutch. At this point, the pedal must be released to allow the die slide to return to its normal *out* position.

The slide feed, much like a dial feed, permits use of short stroke presses and makes it unnecessary for the operator ever to get his hands under the punch.

Table Feeds

In the airplane industry during the war, considerable use was made of the socalled rubber-pad press. A heavy rubber pad on the slide formed the metal into the die below, thereby eliminating the necessity for expensive mating dies. Different dies, or form blocks, are laid out on a table, and a great variety of parts is formed or stamped out at one stroke of the press.

For increased efficiency and safety, die tables are loaded outside the press and then roll into place under the rubber platen. Two-speed motors permit the table to start and stop slowly to keep blanks from being thrown out of position and to speed up the middle portion of table travel, thus reducing cycle time.

Hydraulic and pneumatic cylinders can be used to move the tables, but for long travel motors are simpler. Timing of the table with repect to the press slide can easily be accomplished by limit switches, so interlocked that a table will remain outside the 'press until everything is cleared away to receive it.

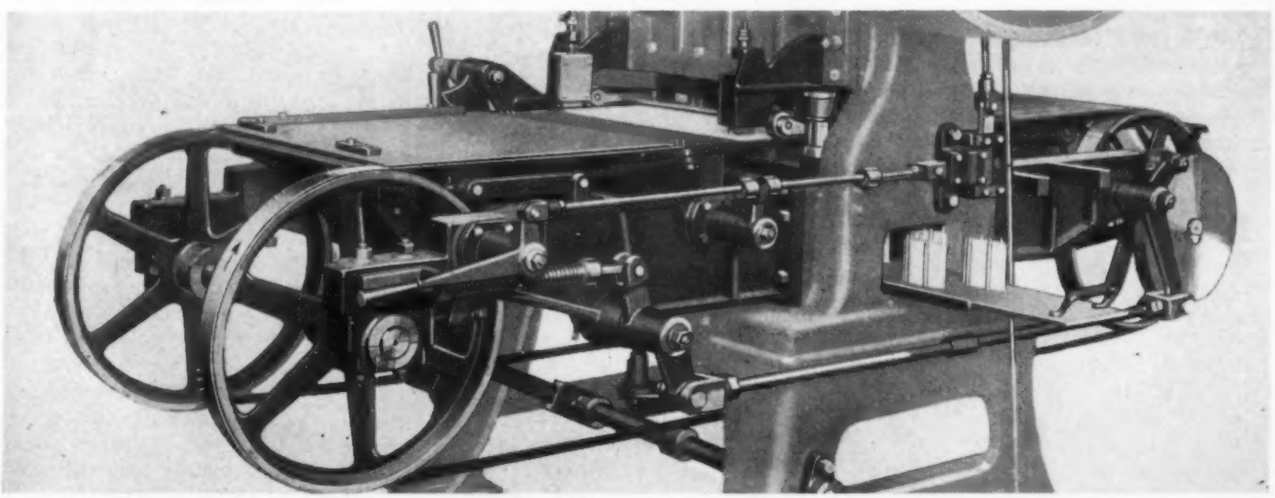
Sheet Feeds

This type of feed is arranged to handle a whole rectangular sheet of tin plate, fiber, rubber, steel or brass. Sheet feeds vary so widely in detail that it is possible to describe only a few specific examples.

One special sheet feed is attached to a special press for making crown bottle caps, such as those used on soft drink bottles and beer cans. A sheet, trimmed to give a fixed distance between the edge and first row of lithographed markings, is introduced to the guides at the rear of the press, which is itself inclined to facilitate ejection of the finished caps.

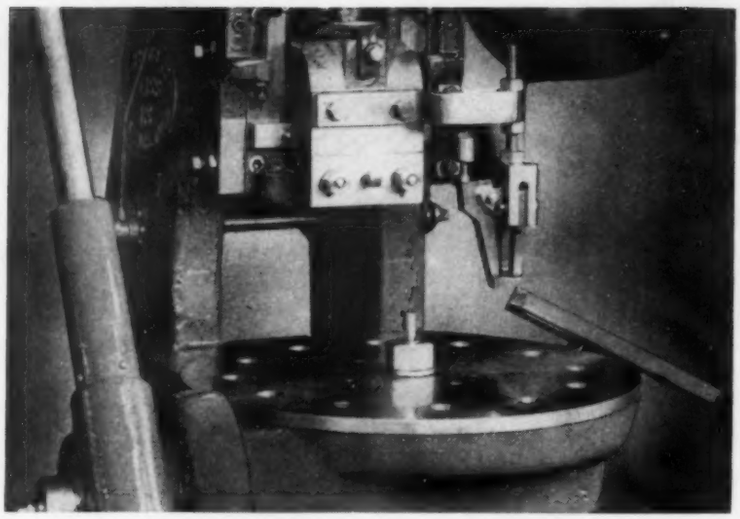
Pawls on feed bars catch the edge of the sheet and advance it upward toward the die. When the stock is clamped by action of the punch, the feed bars move back and the next series of pawls catch the edge and advance the sheet. Pawls must be set an even pitch length apart but, as all crown caps are the same size, they are not made adjustable. When the entire sheet is punched, it is ejected automatically to the front of the press. The machine blanks and forms 16 caps per stroke at a speed of about 100 strokes per min.

Another type of sheet feed employs



BAND-TYPE CONTINUOUS CONVEYOR FEED is employed for punching large sheets of tin plate, paper, *and similar materials with extreme accuracy. Feeds of this type are engineered for one job only*

GRAVITY CHUTE FEEDS, *considered simplest of mechanical feeds, are limited to pieces that will not cock in the chute. Presses are usually tilted so weight of pieces feeds them into die*



EJECTORS *speed up die operation. This one, used with a dial feed, has fingers that hook over shell flange, draw it from die and release it so an air blast can blow it into adjacent chute*

a continuous conveyor of the hand type and feeds comparatively large sheets of tin plate, paper and the like across the dies with extreme accuracy. A skip motion can be added to prevent cutting half blanks at the beginning and end of the sheets. Such feeds are engineered for one job only and, as the development cost is high, they are practical only when the production volume is great.

Still another type of sheet feed is for stagger and zig-zag feeding in single- or double-action presses for producing shallow boxes, covers, can tops or similar items in a single die. For stagger feeding, inclined presses are fitted with tables, gages and also circular cutters to separate the scrap from the sheet.

Zig-zag feeds are capable of taking sheets larger than those that can be easily handled by a man. Sheets can be moved laterally as well as forward, so a single die can be used to give maximum scrap economy.

Gravity Chute Feeds

Simplest of mechanical feeds, a gravity chute feed consists of a chute of suitable size and shape down which the pieces are guided to the die. There is often an escapement mechanism, timed from the press, to permit only one shell at a time to slide into the die.

Presses using these feeds are usually tilted enough so the weight of the shells keeps moving them down the chute. Some presses are even set in a horizontal position. Use of these feeds is limited to pieces that will not cock or overlap in the chute, and they are often used on automatic machines that thread, trim or bead shells.

Ejection Devices

In an ordinary blanking operation, blanks are pushed through the die and bed of the press into a tote box or onto a conveyor. When using compound dies, however, the blank remains on the die or goes up in the punch and means must be found to get it out of the way.

Often such jobs are done in presses that are set in the inclined position, and the force of gravity, aided by an air jet, clears the die. The time necessary for the blank to clear the die may determine the speed of operation and the length of stroke required for a given job.

Some dies are so expensive that the owner cannot afford to take a chance on having the blank hang in the die. In such cases, a positive ejector is used. Such a device, timed from the press, can sweep the die clear.

In a dial-feed redrawing job, where there is no taper involved and no flange is left on the shell, the piece can be carried around in the dial to another station where it drops through. To make sure the piece is clear the dial, an adjustable finger is attached to punch or slide which pushes the shell through. Where construction of the die permits, the shell can be pushed clear through by the punch itself.

Other classes of stampings must be lifted out of the dial. Often it is possible to use a cam- or crank-operated ejector, which comes up from underneath, in a later station during the time the dial is motionless, to lift the piece out of the dial bushing. An air jet can blow the shell off. For certain jobs the piece can ride on a cam track under the dial. As the dial moves, the cam pushes the shell up out of the dial bushing so it can be either blown clear or removed by the operator.

Still another device consists of a pair of fingers attached to the punch. It hooks over the flange of a shell and draws it out of the dial as the punch goes up. A kicker or an air jet throws the shell clear when the fingers open near top of stroke.

Feeds such as those described above constitute only a partial list of the ones which have been built for power presses over the past years. The future will undoubtedly see many more.

As mass production increases, special feeds will be developed to meet the demand. Precision feeds operating at higher speed and with greater accuracy are already in the planning stage. Feeds more completely automatic to cut production cost and improve safety records will be produced as the need is shown. Makers of the basic mass-production tool, the power press, are aware of the trends and will fulfill industry needs for automatic equipment.

WHAT SIZE IS HOT WORK?

... That depends on the materials and the temperature. Both warm weather and operating heat must be considered when making close fits with aluminum and magnesium

By L. W. MACOMBER and C. N. WEILER
LYNN RIVER WORKS, GENERAL ELECTRIC CO.

Surface pyrometers can take a temperature reading of the work in about 5 sec. The micrometer is also checked before taking final measurements of critical dimensions

TEMPERATURE VARIABLES in measurement are a constant problem in all extremely close-tolerance shop operations. Sometimes these variables can be minimized through the use of temperature control or instruments made of special alloys. Even under best conditions, however, they must be under constant consideration if accurate production results are to be obtained.

The basic problem is that units of linear measurement such as the inch, foot, yard, and meter are absolute values, unaffected by temperature, but the standards which represent these values are made of metal, thus are correct only at certain temperatures. The United States and some other nations have agreed upon 68 F. (20 C.) as standard temperature, thus all reference standards in these nations are correct at or have known errors only at this temperature. Therefore, through the control exercised in the average standard gage room, all other measuring instruments, standards and gages are correct (or have known errors) at 68 F., through comparison with masters checked at the Bureau of Standards.

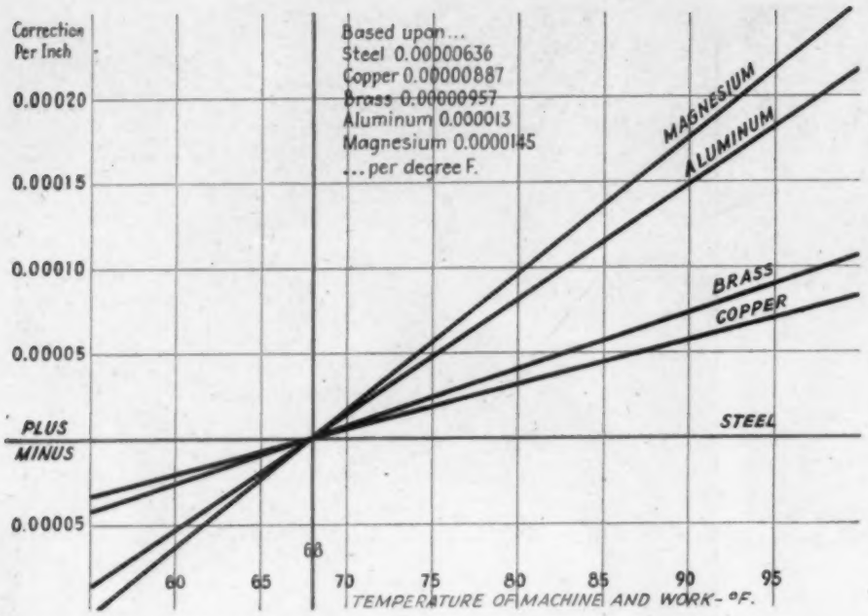
Because differences in coefficient of expansion are negligible among ferrous metals, ferrous tools and gages measuring steel or iron parts will indicate the same measurement at any reasonable temperature—providing temperatures of gage and work are the same.

This is not true in measuring work with a different coefficient of expansion, such as aluminum, which expands approximately 0.000006 in. per inch per degree more than ferrous gages. Therefore, a part of aluminum 10 in. in diameter at 90 F., should measure 0.0013 in. oversize, with a steel gage, to be correct at 68 F.

In the accompanying chart for determining the correction for difference in expansion of dissimilar materials, the measuring device is considered as steel and diagonal lines are shown for copper, brass, aluminum, and magnesium. This chart is based upon coefficients for pure metals in the lower temperature ranges, and must be modified for alloys having different coefficients.

All metals expand or contract uniformly per inch per degree in all directions, regardless of shape or size. However, parts will have different rates of change in a falling or rising temperature, and until a uniform temperature is attained throughout, will not be stable in size or shape.

If a part has ribs or heavy sections adjacent to lighter sections and is machined at an elevated temperature, distortion is likely to occur in



Temperature correction for nonferrous metals measured by steel or iron devices correct at 68 F. A vertical line is drawn from the part temperature at the chart foot to the appropriate diagonal line, and a horizontal line extended from their intersection to the left-hand column to indicate the correction to be made per inch of diameter or length

heating and cooling. The degree of distortion will depend upon the shape of the part and the temperature differences, which will in turn depend upon the rate of heat dissipation in different sections. Distortion also indicates that unrelieved internal stresses may be present.

Sources of Error

Whatever the situation, it is always necessary to understand the possible sources of temperature errors in machines. The most frequent ones are: direct sunlight falling on all or part of a machine, particularly on one of large size; heat generated by motors, friction in bearings, or other causes; heat from cutting tools conducted to the machine; changes in shop temperature.

Expansion or contraction from these causes may be local and cause unequal distortion of parts and inaccuracies in machining by changing the relation of the tools to the work. Relatively long machining operations, as in gear hobbing and jig boring, are particularly susceptible to these errors. This type of error will vary from a few ten-thousandths to 0.010 in. or more, depending upon the temperature change and the length and shape of the parts of the machine involved.

Large machines started and run continuously may rise 15 to 20 F., and take two or three days to reach ultimate temperature. For this reason, large units on close work should be equipped with refrigeration of the coolant and lubrication systems, to maintain temperature differentials low and constant enough for satisfactory work.

Part Intermediate Housing — Planning Sheet 475076 — Page 6 (9 Pages)
Compiled by E. J. Shore — Copies to A. E. G — Date 10-8-47
Revised — Issued

Station	Oper No	Operation	Per	Price	S.U.	Lot
6-18	15	finish turn outside, bore & groove				

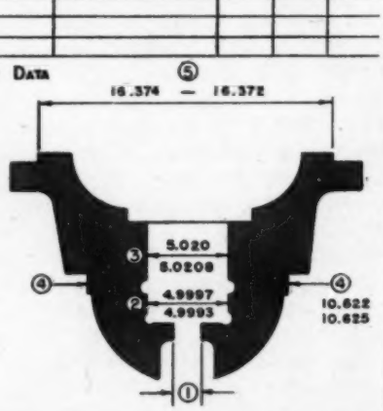
Size	Machine	Coolant	Speed	Feed
56"	vertical turret lathe	turn	140	0.012
		bore	140	0.006
		bevel	89	0.003
		undercut	140	0.006

Quan.	Tool	Drg. No.	Wk. Prod. Min.	Wk. Prod. Ord.	Tool Life
2	turning and facing tools				
1	turning tool 5/8 sq.				
1	chamfer toolbit				
2	bevel toolbits				
1	boring bar				
1	grooving toolbit				
1	plug gage				
1	ring gage				
1	dial bore gage				
1	set size blocks				

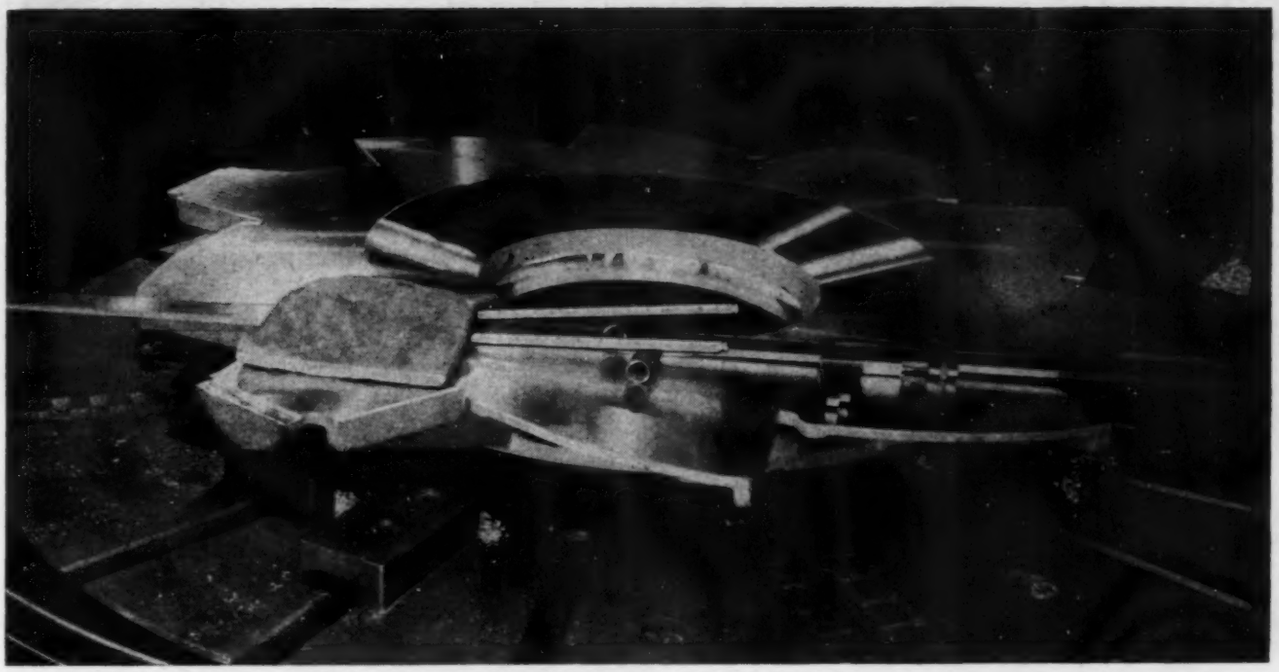
TEMPERATURE CHART

F.	1	2	3	4	5
64°	3.2503	4.9994	5.0203	10.6232	16.3725
68°	3.2504	4.9995	5.0204	10.6235	16.3730
72°	3.2505	4.9997	5.0206	10.6238	16.3735
76°	3.2506	4.9999	5.0207	10.6242	16.3740
80°	3.2507	5.0000	5.0209	10.6245	16.3744
84°	3.2508	5.0002	5.0210	10.6248	16.3748
88°	3.2509	5.0003	5.0212	10.6252	16.3753
92°	3.2510	5.0005	5.0214	10.6255	16.3758
96°	3.2511	5.0007	5.0215	10.6258	16.3762
100°	3.2512	5.0008	5.0217	10.6262	16.3767
104°	3.2513	5.0010	5.0218	10.6265	16.3771
108°	3.2514	5.0012	5.0220	10.6268	16.3776

SET UP DATA



Planning sheet gives mean adjusted dimensions in steps of 4 F. for each important dimension to be machined on the work



Temperature is checked on both the large magnesium part and the vernier caliper before measuring for final machining cut

Temperatures on small to medium work, particularly on heavy cuts without coolant, may run very high; a 60 to 80 F. rise is common. When a coolant is used, the rise may be from 0 to 40 F. or more depending upon the load and type of coolant used. Water coolants are much more effective than oils in keeping temperature down.

The inspector in the shop usually has a better chance of accuracy in his measurements than the machine operator, because the inspector usually receives his work at shop temperature. However, he must exercise care in seeing that his measuring tools are not handled to such an extent that their expansion is a substantial portion of the work tolerance.

The inspector should also be stationed in a section free from violent temperature changes that would affect both the work and his tools in differing degree.

How to Check Temperature

There are various methods of checking temperatures. Thermometers, recorders, and thermocouple-operated instruments may be used on applications in air, on machines, or on the work. Thermocouple instruments respond faster than other types, and are generally more convenient and accurate for application to the work.

The sensitivity of the hand to the difference in temperature of two objects is not reliable, as the apparent coldness is governed by the material and finishes as well as the temperature. Also, on two pieces of the same material of similar shape and finish, a 7 F. temperature difference is just noticeable to the hand; and a surface that is substantially warmer may be actually 20 F. higher. Large errors may be made if the hand is used for determining whether or not two objects are at the same temperature.

On sizes below 1 in., and tolerances over 0.0005 in., little difficulty is normally experienced with any ordinary material unless the temperature rise is unusual.

In machining iron or steel parts, if the temperature rise from machining is not excessive, the tolerances not too close, and reasonable precautions are taken to see that the gages are not greatly above or below the work temperature, reasonable accuracy may be assured.

However, in measuring hot ferrous parts on a machine without a coolant, an allowance for expansion may be necessary. If the temperature is not measured, the average expansion may be determined by measuring the work when hot, then allowing it to cool and measuring again. This contraction is not likely to remain constant, because the heat and expansion increase as the tool loses its edge; therefore, a frequent check should be made in order to maintain sizes.

When a coolant is used, measurements may be less difficult and more accurate for two reasons. Temperatures are not as high, and the measuring instrument in some cases can be brought up to, or near, the temperature of the work by holding it in the coolant stream. However, it is still sometimes necessary to make an oversize allowance to insure the work being correct when cool.

Experience with Magnesium

In machining parts of aluminum or magnesium in large sizes, however, difficulties from temperature variations are the rule rather than the exception, particularly if tolerances are medium or close. Solutions for some of these problems, based on experience at the Lynn River Works, are suggested below.

Machined parts used as examples range up to 42 in. in dia. with tolerances from 0.0005 in. on sizes up to 5 in. or 0.002 in. on diameters up to 40 in.

For some time, rejections were high, arguments between the inspectors and the operators were common, and parts gave different measurements at different times. This resulted in high losses and considerable delay.

Temperature differences were suspected, but had not been anticipated, nor a solution for them planned. Study proved them the culprits, instruments for contact temperature measurement were procured, and

At final inspection, part has usually returned to room temperature, but temperatures are checked with surface pyrometers to assure accurate work

the jobs planned properly to assure maintenance of tolerances.

The accompanying planning sheet not only lists the tools, feeds and speeds, but also shows a sketch of the part and a table of mean adjusted dimensions in steps of 4 F. for each important dimension machined. This sheet is posted beside the machine and on the inspection area for reference when measurements on this part are made.

Because of variations from standards, and for other reasons, fixed go and no-go gages were replaced by adjustable tools, such as vernier calipers, indicating-dial bore gages and micrometers.

A large magnesium casting is illustrated which has been machined close to size. Preparations have been made to measure the 39.687-in. rabbet dia. to get the exact size before taking the final cut of a few thousandths to the exact dimension.

The vernier caliper is laid in close contact with the casting and glass thermometers are applied to both the casting and caliper with modeling clay over which felt is laid. Readings of both thermometers are observed until they read alike and no further change occurs, which takes about five minutes. This temperature is noted, and the table on the posted planning sheet consulted for correct size at this temperature.

The diameter is now measured, the final chip taken, and the work is checked again for finish size. In handling the vernier caliper, the felt pad is also used as insulation for the hand.

A temperature reading is sometimes made with a surface pyrometer. With this instrument, the reading is obtained in about five seconds. An outside micrometer is used for measuring, which is also checked for temperature before final measurement.

On bores in sizes from 3 in. to 6 in., measured with a dial bore gage set to a master ring, both ring gage and work are checked for temperature. The dial bore gage is then set to zero in the ring, the temperature table on the planning sheet consulted, and the bore checked to the amount oversize indicated.

In the inspection department, pyrometers and temperature tables are used in the same manner. Here the problem is somewhat simplified, as the part usually assumes room temperature before inspection. Because the measuring instrument is also at room temperature, it is not usually necessary to wait for equalization of the two.

Another practical method that may be used for gaging machined sizes on non-ferrous material at elevated temperatures is to make the fixed or adjustable gage of the same material as the work with hardened steel contact surfaces. Having the same coefficient of expansion, it will assure the correct measurement at any temperature, providing it is calibrated correct at 68 F.

For example, a large micrometer or snap gage may be made with an aluminum frame, or a pin gage may be made of an aluminum rod with hardened-steel inserted ends. If these special fixed gages are impractical for use in direct measurement, they may still be used to advantage as masters to which the standard outside or inside measuring instrument may be compared to find the expansion factor before measuring the part.

A Complete Solution

Air conditioning and a temperature-controlled coolant would eliminate all these complications. Air conditioning alone would solve a large percentage of the problems, and unquestionably a large return would be realized from more comfortable working conditions, resulting in greater output and lower labor turnover.

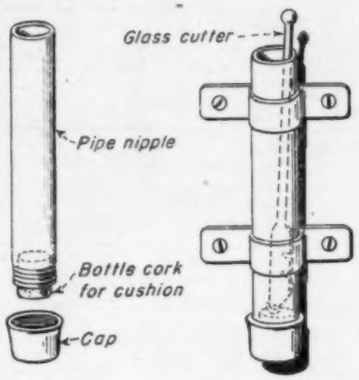
A partial temperature control may be realized in cold weather by the use of thermostatically controlled heating units and exhaust fans for removing excess heated air. The location, size, and distribution of the ducts for incoming air must be carefully located to avoid drafts and local cold or hot spots.

Temperature-controlled coolants have long been used and there are varying opinions of their value. Where magnesium is being machined, however, opinion is widespread that no lubricant is needed. In addition, the most suitable oils would add to the fire hazard. Difficulties involved in designing guards which would confine the coolant satisfactorily at high speeds and at the same time provide easy access to the work are considerable. Other reasons for not using coolant are the necessity for cleaning the work and the difficulties involved in making accurate measurements at locating points with chips in the way.

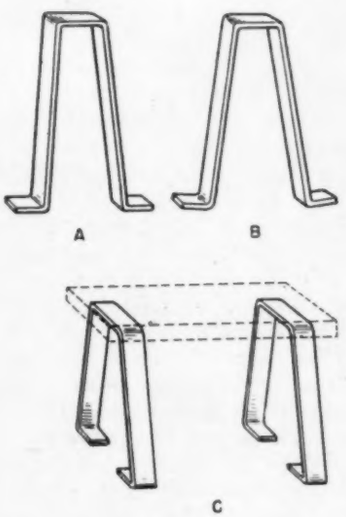
In the final analysis the decision as to whether or not it is necessary to observe precautions, or the degree to which these precautions should be observed, depends upon the physical dimensions, the tolerance, the temperature difference, and the material machined.

Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

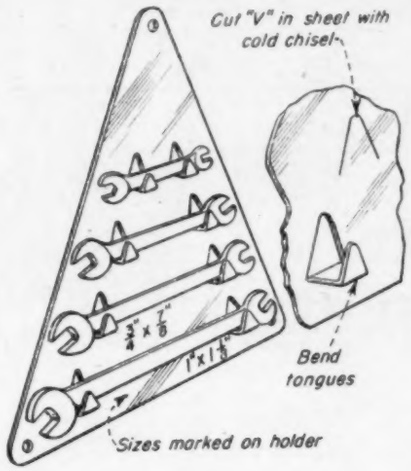


WHEN THE maintenance man wants to cut an occasional glass panel or window pane, he may find that the only glass cutter on hand is nicked or rusty. To prevent this, push a cork into a pipe nipple for a cushion, screw a cap on the end and fasten to the wall for a safe receptacle for the cutter. Pour a little light oil into the nipple to prevent the tool from rusting.



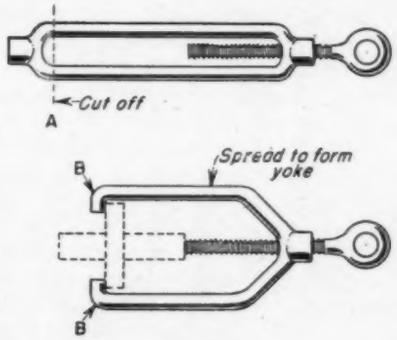
TRESTLES are commonly made with the feet out as at *A*. When heavy loads are applied, the legs may spring and the feet cock up as at *B*, leading to collapse. If the feet are turned in as at *C*, the legs are much more likely to stand up under heavy loads.

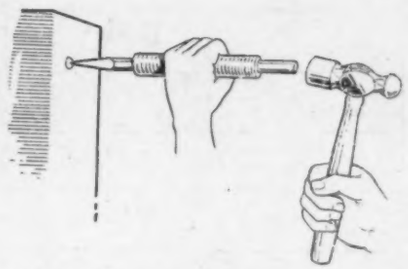
SHEET-METAL RACKS make instant selectors for wrenches and other small tools, keep them in order at low cost. Cut the sheet to triangular shape. Then, starting from the



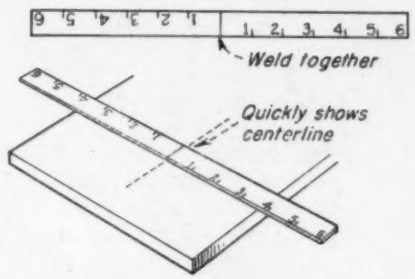
top, cut a series of inverted V's along the two edges. Push out the V's at right angles and turn up the ends to form supports for the tools. If desired, letter the size under each tool. When set up on the wall behind the bench, this rack keeps the tools in proper order and discloses immediately if one is missing.

GEAR PULLERS and the like can be made from old turnbuckles. Cut off the legs of the turnbuckle as long as possible, as at *A*, then bend hooks as at *B*. By using a variety of sizes of turnbuckles, one can readily make up a set of pullers to handle anything from a small collar up to a gear say 6 in. in diameter.

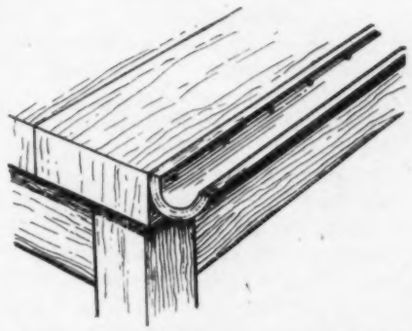




THOSE WITHOUT plenty of callouses on their hands often find that a slender cold chisel sets up an unpleasant sting after continued use. To avoid this, put a short length of rubber tubing over the chisel body to act as a shock absorber. But don't forget to hit the chisel!



DOUBLE SCALES will speed up layout work. Weld together two scales end to end, so that they read each way from center. To find the centerline of say a 6-in. flat, lay the scale on the work and adjust to equal readings on the two scales.



A GUTTER for the work bench will catch small parts that roll off, and it won't be in the way. Split a piece of 1½ to 2-in. hose lengthwise and nail the edge of one piece to the front of the bench.

ALLIS-CHALMERS MANUFACTURING COMPANY
WEST ALLIS WORKS

SKIN ERUPTION CASES LOGGED AT Main HOSPITAL DURING AUGUST 1945

Name	Clock No.	Shift	Occupation	Material Worked With	Protective Creams Used	Previous Skin Eruption	Foreman
Joe Brown	148	1st	Machine Operator	Steel	No	May, 1945	Mr. L. Jones
Verne Doe	841	2nd	Honing Machine Operator	Iron, Steel, Kerosene	Yes Cream #1	None	Mr. S. Black
Robert Greene	746	1st	Drill Press Operator	Cast Iron only	No	None	Mr. A. Smith
Bill Humphreys	9134	3rd	Tool Grinder	#6 coolant & #2 cutting oil	Yes Cream #6	About 1 year ago	Mr. C. Simon
Donald Burkee	#2 Fdry. 64562	1st	Molder	Hot wet sand	No	None	Mr. W. Lee
Alfred Rose	88261	1st	Carpenter	Maple, oak and pine	No	About 1 year ago	Mr. J. Redding

Fig. 1—Typical monthly report of dermatitis cases, as submitted by shop hospitals to the health and safety dept.

Educational Program Controls Dermatitis

With proper care and an intensive educational program industrial dermatitis can be banished and great savings effected

BY W. F. SCHOLTZ
Supervisor, Industrial Hygiene Section
Health and Safety Dept.
ALLIS-CHALMERS MFG. CO.

A CONCENTRATED program of industrial dermatitis control and prevention, begun in 1943 at the West Allis plant of the Allis-Chalmers Mfg. Co., has resulted in a 73.8% decrease and a reduction from 10.3 to 2.7 in the number of cases per million man-hours of exposure to date.

Carried on by the health and safety department in cooperation with the manufacturing division, the program not only resulted in substantial savings in the cost of compensation and medical expenses for doctor's cases—$3243.75 in 1945 as against $13,753.50 in 1943—but it has also paid off in terms of healthier workers.

Before attempting to set up a program of this kind, a review was made of all available data describing methods of control and prevention of dermatitis. Also, the Industrial Hygiene Unit of the Wisconsin State Board of Health was asked to assist in making a survey of those locations where the most obvious cases were being reported, as it was felt that the most logical approach was to concentrate control efforts in areas where the incidence of dermatitis was highest. With the assistance of this unit, a system of keeping records was started and control measures were instituted.

The first step was to record all cases of skin irritations reported at the shop hospitals. Each of the five shop hospitals submitted a monthly report of these cases to the health and safety department, Fig. 1. Each case was then reviewed and the particular exposures to the workman were carefully studied.

A tabulation of skin-eruption cases for each month of the years 1943 to 1946 is shown in Fig. 5. Of the 426 cases logged at the hospitals in 1943, 106, or approximately one quarter, were of such severity as to require treatment by a doctor. On the basis of the 1943 study, it was found that the major causes of dermatitis were:

1. Failure on the part of the worker to do a thorough washing job at lunch time and at the end of the shift. One reason for this was the lack of information regarding the importance of personal hygiene, especially when exposed to solvents, paints, varnish, chemicals and cutting oils. It was interesting to note that workers using protective creams felt that all that was necessary to clean their hands was to hold them under running water, rinse off the dirt and wipe their hands. A second reason for failure of workers to wash thoroughly was that they did not like the type of soap furnished in the dispensers.

2. Failure on part of workers to change into clean work clothes, especially on operations where there was an exposure to cutting oils and kerosene.

3. Exposure to the high concentration of disinfectant used in the cutting-oil and water-soluble solutions in the machine-shop section.

4. Exposure to solvents such as kerosene, naphtha, lacquer thinner and alcohols, especially in the coil-winding department, where all workers are women.

In order that an average cost per case could be established, the total

suds appeal!

Industrial dermatitis is a potential threat to many workers in factories because some of the chemicals and other substances used in the manufacturing processes may be irritating and harmful to the skin. The most important preventative measure against occupational dermatitis, and one that should not be overlooked or treated lightly, is cleanliness. It has been found that the common procedure of washing the hands in soap and water is of the greatest significance in guarding against this affliction. These few simple rules will go a long way in preventing such infection:

1. **Use only warm water.**
2. **Wet the hands thoroughly before applying soap.**
3. **Dispense powdered soap into the palms of the hands and rub into the skin, using as little water as possible. Wash until all shop soil is gone.**
4. **In washing, pay particular attention to the spot around the nails and between the fingers.**
5. **Rinse the hands thoroughly until all the cleanser is gone, and then check the hands for any remaining dirt. Re-wash, if necessary.**
6. **Carefully dry all washed parts especially between the fingers, back of the hand and around the nails.**
7. **If, after washing, you find that your skin appears to be irritated, notify your Foreman immediately and then report to the Shop Hospital.**
8. ***Do not* use solvents, strong alkalies or harsh abrasive cleaners for washing.**

On jobs where there is an exposure to paint, varnish or resinous material, special cleaners have been provided for their removal from the hands. These are available through your Foreman.

Prepared by: Health and Safety Department
Industrial Relations Division

Fig. 2—Typical bulletin-board notice of the type successfully used for teaching employees the proper way of washing to avoid dermatitis

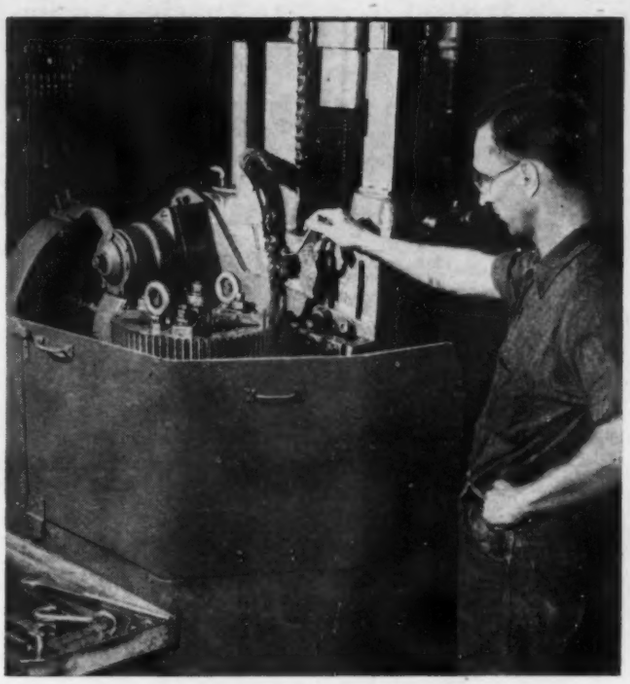


Fig. 3—Well-built splash guards, of the type installed on this gear hobber, assist in keeping clothing free from oil and improve shop cleanliness

Fig. 4—A practical demonstration on how to remove shop dirt goes a long way in instilling the principles of personal cleanliness

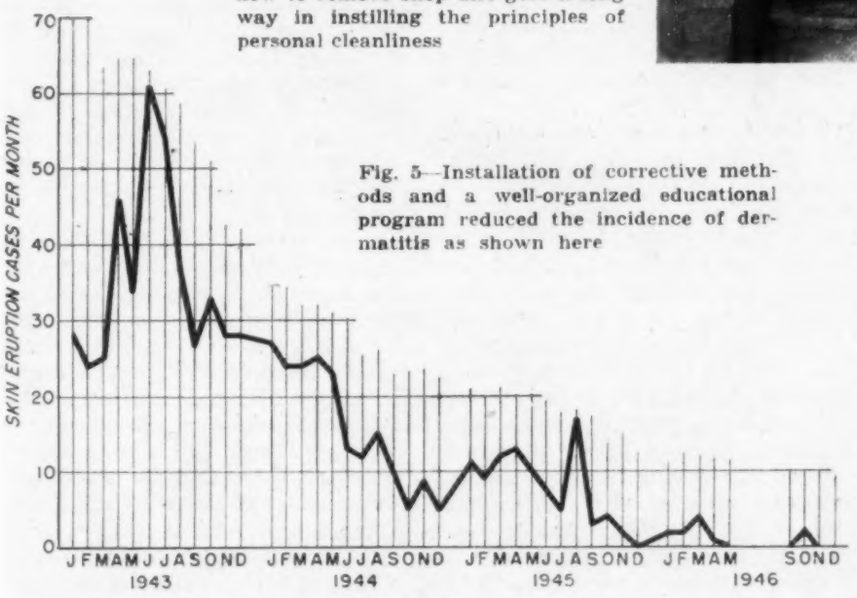

SKIN ERUPTION CASES PER MONTH
70
60
50
40
30
20
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M S O N D
1943
1944
1945
1946

Fig. 5—Installation of corrective methods and a well-organized educational program reduced the incidence of dermatitis as shown here

compensation and medical costs for the year, amounting to $13,753.50, were divided by the number of cases, giving an average cost per doctor's case of $129.75. The cost of protective creams during this same period was $1729, while the total cost of disinfectants for the year was $425.

In setting up the new program aimed at eliminating industrial dermatitis, it was necessary to obtain accurate, first-hand information on the alleged condition. This was done by filling in a data sheet for each reported case, giving a brief description of the accident or exposure, a description and the extent of the injury, and such pertinent information as the age of the patient, time

Savings Effected by a Dermatitis Control Program

	1943	1944	1945	1946*
Total Cases Reported	426	191	100	11
Cases Requiring Medical Care	106	48	25	0
Cases Per Million Manhours of Exposure	10.3	4.0	2.7	0
Total Cost of Compensation and Medical Attention for "Doctors' Cases"	$13,753.50	$6,228.00	$3,243.75	
Average Annual Cost per "Doctors' Case"	129.75	129.75	129.75	
Cost of Protective Creams	1,729.00	1,345.00	400.00	
Cost of Disinfectants	425.00	—	—	

* No Doctors' Cases were reported in 1946. However, due to abnormal operations in this period, complete costs are not included in this tabulation.

of the accident, and name of his or her foreman. All pre-employment history of dermatitis was also recorded, together with the name of the doctor or specialist who treated the case. If the employee had previously been treated for this trouble while in the company's employ, a record was made of his work history, exposure, etc., together with the name of the physician or specialist, and whether treatment was administered at the plant hospital or at the doctor's office.

A thorough investigation of the patient's present work was then made, and information recorded as to the length of time he had spent in his present department, the length of time on the present job, and the date of the present onset. If he had been exposed to chemicals, primary irritants, solvents, lubricating or cutting oils, the name of the material was recorded, together with information as to where this was purchased and the name of the manufacturer, if possible. Other questions to be answered included: Was a protective cream used? What other protective equipment was employed? Where and how did the worker wash, and what kind of soap did he use? Was the water hot, warm, or cold? What type of towel did he use and how often does he wash? Are other workers in the department having the same trouble, and is he now on the job, or what is he doing? If any corrective action or recommendations were discussed with supervisors or other pertinent parties, this was also noted, and a record made of whatever recommendations were adopted.

With the information thus gathered, a planned program of attack was established and diligently carried out. The results of this effort can be seen in the table. In order to bring about this record, the following procedures were carried out:

1. A program of personal hygiene was instituted and brought to the workers through their foremen. Also, written instructions on how to wash correctly were passed out to the workers. See Fig. 2.

2. A program was instituted whereby two types of shop towels were made available to the workers. A blue towel for wiping parts and machinery, and a white one for wiping hands and face, were furnished.

3. Employees were encouraged through their foreman to change frequently into clean work clothes.

4. The promiscuous use of protective creams was eliminated. (Workers are apt to assume that the use of these creams alone will prevent dermatitis and do not take the necessary precautions of washing thoroughly). To those workers who have used protective creams in the past, it was recommended that they follow the outlined personal hygiene procedures. Jobs that require protective creams were surveyed and specifications for their use established.

5. As a result of the study the manufacturing division discontinued the use of disinfectants in the machines. In order that these machines would be clean and free from contamination, a program of periodically draining the oil and then flushing the machine with a washing solution before adding new oil was instituted.

6. On operations where there was an exposure to kerosene or a similar solvent, a pint of No. 10 viscosity lubricating oil was added to each gallon of solvent. The addition of the lubricating oil plays a very important part in the elimination of the defatting action which results from the exposure of the skin to these solvents.

7. On operations where there was an exposure to naphtha, and where it is absolutely necessary to use this solvent on the hands in order to remove paint, varnish and other resinous substances, five ounces of lanolin per gallon of naphtha is added.

8. In some instances splash guards, of the type shown in Fig. 3, were provided in order to protect the worker against oil splashes. This insured a cleaner work area for the worker and eliminated the necessity of wearing protective aprons.

If the medical department noted a case which did not respond immediately to the treatment being given, they recommended that the worker be transferred to an operation where there was no exposure to any of the compounds or materials previously worked with. As soon as the worker's condition cleared, he was returned to his previous job and a careful watch was kept by the medical department and his foreman. If the condition reappeared, the worker was referred back to the medical department which, at the discretion of the attending doctor, might send the worker to a skin specialist.

The return on the same job or on another job was left to the attending doctor for final decision, and his recommendations as to placement carried out. Many times it was necessary to submit samples of the materials worked with to the skin specialist for patch testing and, in some few cases, as many as 35 items were submitted before a definite conclusion was reached.

It has been found that close cooperation with the medical staff in furnishing them with as much information as possible makes it possible to carry on a much better preventive program. In turn, a great deal of valuable preventive information has been relayed back through the doctors.

Thus, through a controlled program Allis-Chalmers has been able practically to eliminate industrial dermatitis among its some 18,000 employees at the West Allis works and has in two years effected a saving of $18,035.25 as compared to the 1943 total of medical and compensation costs alone. Elimination of lost manhours because of dermatitis, and improved employee relationships have been no small part of the returns of this investment. Dermatitis control does pay dividends.

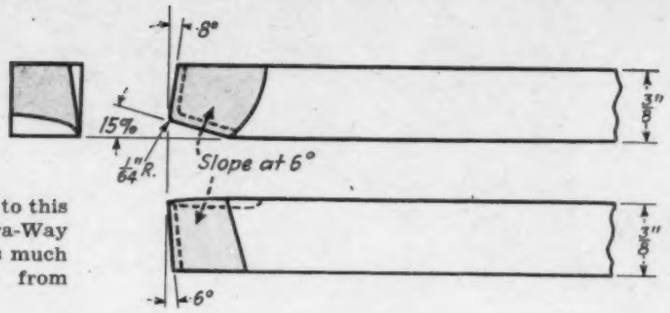


FIG. 1
Test tools were ground to this standard form on a Bura-Way grinder to eliminate, as much as possible, variation from tool grinding

Cast Alloys Vary in Cutting Efficiency

Extensive investigation on tool breakdown, life, speed and feed change, interrupted cuts and tool grinding showed wide variation between materials and excellent results by proper use

By J. B. DYM, Section Engineer
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CAST ALLOY MATERIALS of the cobalt-chrome-tungsten base type have, in the past few years, become increasingly important as cutting tools. To determine the comparative cutting efficiencies of the numerous brands of cast alloys on the market and to develop as much practical information as possible on the design and application of tools made from these materials, the Manufacturing Engineering Laboratories at Westinghouse have carried out an extensive investigation.

This investigation has shown some startling results: (1) extreme variation in cutting efficiency between materials offered for the same purpose by various manufacturers, and (2) remarkable increase in metal-removal rates and tool life made possible by proper application of cast-alloy tools.

Test Conditions

All tool tests were made on a 20-in. heavy-duty lathe with a rheostat-controlled d.c. drive for exact speed regulation. Test logs were forgings, heat-treated to 170-180 Bn, made from steel of the following composition: carbon 0.44, manganese 0.74, phosphorus 0.016, sulphur 0.034 and silicon 0.24.

Uniformity of test logs was checked by test readings on the cut surface of the portion of the log remaining in the chuck after the log was reduced to final size, and also by occasional check cuts with a previously tested tool. The material was uniform on various thicknesses of the test logs and also from log to log.

The procedure for test tools outlined by the American Standards Association covering "Life Tests of Single-Point Cutting Tools" was followed. All test tools were ground to the form shown in Fig. 1. To eliminate as much variation in the effect of tool grinding as possible, all tools were ground to a cam on a Bura-Way grinder.

To assure adequate tool support, all tools were held in a tool block and set with a constant overhang. All tests were conducted with no coolant. Seventeen different grades of cast-alloy tool bits (⅜ in. square) were obtained for test. To eliminate any possibility of operator prejudice, all tools were coded and handled in the laboratory under code symbols.

To prevent special tools being supplied as test tools, tools were purchased from mill or jobber stocks. Incidentally, out of tools obtained from 18 sources, one supplied high-speed steel as a cast alloy and two others supplied alloys of such a high iron content that they could not be classified as cast alloys. All three of these materials failed under test conditions used for cast alloys. A description of each test follows.

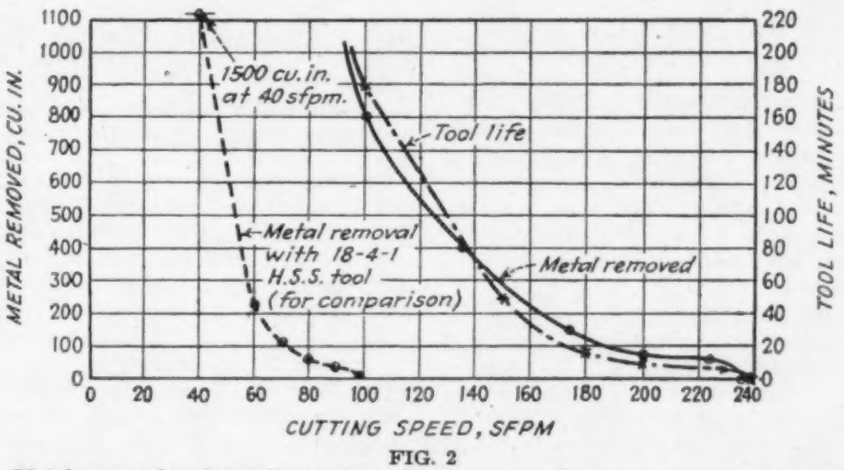


FIG. 2
Metal removal and tool life test results show the effect of cutting speed with a constant feed of 0.030 in. and deph of cut of 0.125 in.

Breakdown Test

The first series of tests consisted of a breakdown test made by facing out from the 4-in. dia. bore of a test ring, 9 in. thick x 18-in. O.D. x 4-in. I.D. A constant depth of cut of 0.125-in., a constant feed of 0.030 in. and a constant spindle speed of 96 rpm. were used.

This resulted in an initial cutting

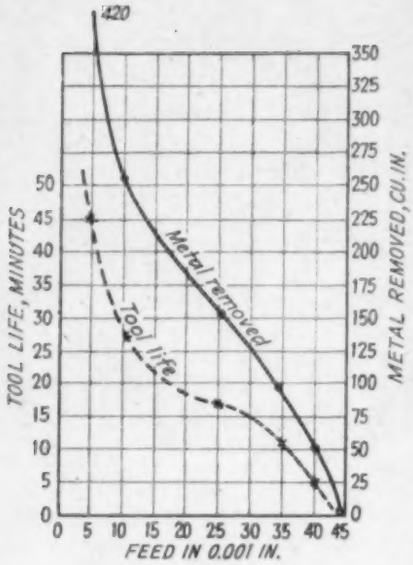


FIG. 3

Increase in feed, with constant cutting speed of 200 sfpm. and depth of cut of 0.125 in., reduces tool life and metal removal, with a slight change in rate for feeds from 0.010 to 0.030 in.

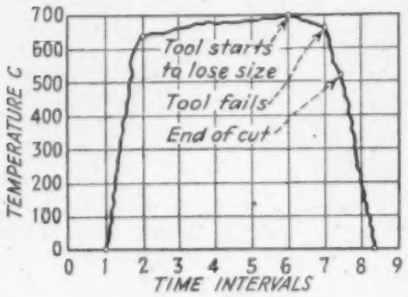


FIG. 4

Cutting-edge temperature chart shows rapid increase as cutting starts, then slow increase tool until begins to lose size, slow decrease to point of tool failure, followed by rapid decrease

speed of 100 sfpm. that gradually increased as the cut progressed. Five tools of each tool material were tested, and the speed at which each tool failed was calculated. Average failure speeds are summarized in Table I.

It does not seem reasonable to evaluate a tool material on the basis of this test alone, as this test indicates only the speed at which a tool will break down because of the combination of heat and cutting pressure increasing as the cut progresses.

The test did serve to eliminate two grades of very low resistance. One was deleted from the table as the manufacturer did not recommend the material for steel cutting. More important, it set a standard cutting speed to be used in a tool life test. From a consideration of these results, a standard surface speed of 200 sfpm. was selected for life tests and, in practice, proved satisfactory.

Life Test

All tools that would withstand the first test conditions were then tested by the life-test method. This test consisted of making a continuous cut on an 8-in. dia. x 60-in. long test log. In conducting this test, speed (200 sfpm.), feed (0.030 in.) and depth of cut (0.125 in.) were held constant.

The tool was run to breakdown, and original and final diameters and length of cut were recorded. From these dimensions, the number of cubic inches of metal removed per tool and the cutting time were calculated. Usually five tests were run with each tool, and the average value was used.

It might be well here to discuss what we mean by the phrase "run to breakdown." It was decided that reliable results in determination of the tool breakdown point are possible by observation. Results of this test are summarized in Table II.

In these tables no identification of the various materials by manufacturer is made, as our comparison of a manufacturer's product is confidential.

The materials, however, showed no correlation between the two tests. The results shown are simply arithmetical averages, but for checking purposes the quadratic average, mode and mean deviation were calculated, and the hardness of each tool material was recorded. There appeared to be no basis for determining the performance of a cast-alloy tool from any of these values, nor in determining the comparative performance of the various materials on this basis.

Chemical compositions were also used in an effort to determine the comparative cutting abilities from the composition, but here again no basis could be found for evaluating on this theory. In general, the best tools contained the highest total percentage of chromium-tungsten-cobalt, but this effect was not entirely consistent.

A metallographic examination of each material was made. Again, in general, the best specimens showed a fine-grained, well-distributed carbide structure, but this also was not conclusive as several exceptions were noted.

The edge impact strength in inch-ounces was determined, but this also proved of no value. It must be admitted that in an analysis of well over 1,000 tests, no basis for determining cutting ability on physical or chemical properties could be determined.

Further work is being done to determine hardness at elevated temperature. The effects of boron, nitrogen and the various carbide formers are also being investigated.

Variation of Speed and Feed

To determine the effect of cutting speed on metal removal per tool grind, a series of cuts were made with constant feed (0.030-in.) and depth of cut ,0.125-in.) at various cutting speeds from 100 to 250 sfpm. Tests were not run at speeds less than 100 sfpm., as the uses of test logs was excessive at low cutting speeds. Result of these tests are summarized in Fig. 2.

To determine the effect of feed on tool life, a series of cuts were made at constant cutting speed (200 sfpm.) and depth of cut (0.125 in.), but at feeds varying from 0.005 in. to the maximum value possible of 0.045-in. without tool breakage. Results of these tests are summarized in Fig. 3.

It will be noted that ordinates at 0.030 in. and 20-sfpm. cutting speed are not identical on Figs. 2 and 3. Tests were run with tools of different manufacture, so this variation only reflects the differences between various tool materials.

The graphs showing the effect of speed and feed on metal removal are accurate only at stated conditions. These relationships are affected by tool style, tool nose radius, the ratio of depth of cut to feed, tool surface finish, as well as the work material and its heat-treatment. The graphs, however, are believed to represent an average condition and show the normal relationship between the variables as they occur in turning operations.

Interrupted Cut Test

To determine the applicability of cast-alloy tools on severe interrupted cuts, a test log was made with four 1-in. slots cut lengthwise of the test log. This caused the tool to strike four shoulders per revolution, or about 450 interruptions per min. at the average test speeds used.

No ⅜-in. cast-alloy tool bit tested on cutting this log at 200 sfpm., 0.030-in. feed and 0.125-in. depth of cut was able to remove metal. All tools failed by simple fracture. Speed

and feed were progressively reduced to a final value of 50 sfpm. at 0.015-in. feed and 0.125-in. depth of cut. At this speed the tools did not break, but failed by chipping of the cutting edge.

In an effort to check the effect of tool strength, a cut was then made with each of two 1 x 1½-in. shank tipped tools, one tipped with cast alloy and the other with 18-4-1 high-speed steel. These tools were similar to that of Fig. 1, except for size.

Tools were tested at 50 sfpm., 0.030-in. feed and 0.125-in. depth of cut, the high-speed-steel tool removing 90 cu. in. of metal and the cast alloy removing 33 cu. in. of metal. Obviously, at 50 sfpm. cast-alloy tools are not competitive with high-speed-steel tools.

To utilize the high cutting speeds possible with cast-alloy tools, it was decided to use a double negative rake grind. The standard test grind was modified to 20° negative back rake and 12° negative side rake. Using this grind on ⅜-in. square tool bits, it eliminated all tool chipping and breakage when making this severe interrupted cut at 200 sfpm., 0.030-in. feed and 0.125-in. depth of cut.

The four best tool materials of the life test were then selected for this interrupted cut test. Five tools of each material were ground and tested. Average metal removal is shown in Table III. It appears that the use of negative-rake cast alloy tools permits taking advantage of the superior cutting abilities of these tools under severe cutting conditions, and at cutting speeds 100% higher than possible with high-speed-steel tools.

TABLE I—BREAKDOWN CUTTING SPEEDS (Cast Alloy Materials)

TOOL SYMBOL	O	P	Q	R	T	V	N	S	Y	U	W	X	M
AVERAGE SPEED IN SFPM.	329	292	289	284	282	277	275	273	269	266	262	252	247

TABLE II—LIFE TEST OF CAST-ALLOY TOOL MATERIALS

TOOL SYMBOL	M	N	O	P	Q	R	S	T	U	V	W	X	Y
AVERAGE METAL REMOVAL IN CU. IN.	94	77	72	54	47	47	46	42	36	33	28	21	19
PERCENTAGE EFFICIENCY.	100	82	77	58	50	50	49	45	38	35	30	22	20

TABLE III—INTERRUPTED CUT TEST (Cast-Alloy Tool Materials)

TOOL MATERIAL	O	P	M	N
METAL REMOVAL IN CU. IN.	58	52	51	49

Tool Grind Test

To determine the effect of the quality of tool grind on tool life, a series of tests using tool material "M" for all tests at identical cutting conditions, but ground by different grinding methods, were made. The grinding methods used were:

(a) Hand ground on shop pedestal grinder using a 36-grit aluminum-oxide wheel.

(b) Cam ground on the Bura-Way grinder. Rough grinding was done on a 46-grit aluminum-oxide wheel and finish grinding was done on a 60-grit aluminum-oxide wheel. This is the standard grinding method used on all previous test tools.

(c) Hand ground on a Blount face wheel grinder. Rough grinding was done on a 60-grit silicon-carbide wheel; finish grinding was done on a 100-grit silicon-carbide wheel.

(d) Bura-Way ground as in (b), but finish lapped on a 220-grit diamond wheel.

Methods (a), (b), (c) and (d) produced a tool of progressively better finish. It will be readily understood that as tool finish became better, tool life increased. The final shape of tool under all grinding conditions was the same.

GENERAL HINTS

Some general hints on the application of cast alloys may be useful:

1. Use tools of small section. If the application requires a large tool, use a cast-alloy tipped tool. Tool designs for tungsten-carbide tipped tools are satisfactory. Use silver solder in attaching cast-alloy tips, as the heat required for copper brazing is detrimental to cast alloys.
2. At the speeds used with cast alloys, chip disposal may be a problem. If so, chip-breaker designs for carbide-tipped tools will work equally well with cast alloys.
3. Cast alloys may be ground with either aluminum-oxide or silicon-carbide wheels. Where the standard carbide grinding setup is available, it can be used without modification.
4. The most important use of cast alloys is for those applications where shock, machine speeds available or other limitations prevent the use of carbides.
5. Keep all clearance angles at a minimum when using cast alloys. Side and end clearance of 6° is best. Also, keep the end-cutting clearance angle small; 8 to 10° is best.
6. Cast-alloy tools cut well when used without a coolant, but a coolant in adequate quantities will improve tool life and work finish.
7. Heat shock is detrimental as cast alloys crack on sudden changes of temperature. This requires care when using coolant in grinding or cutting so as to avoid sudden temperature changes when coolant comes in contact with the hot tool.

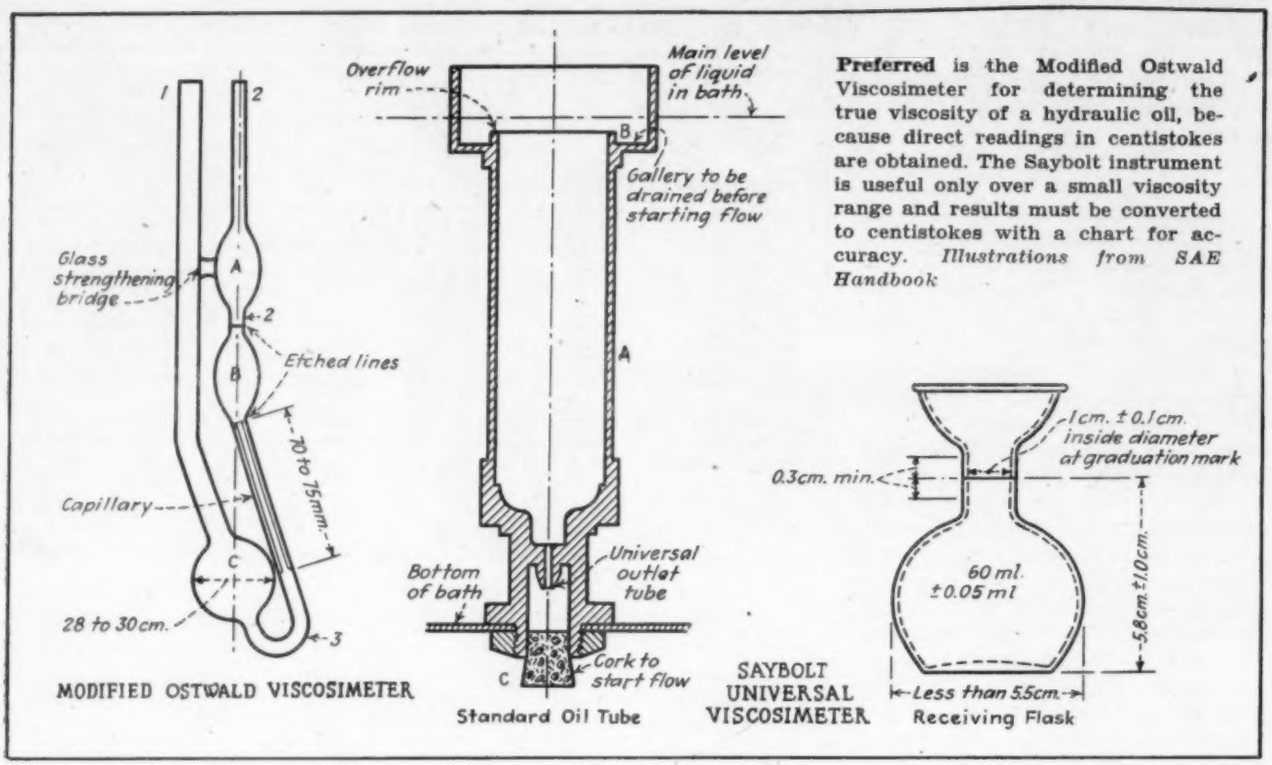
Heat Generated

Early in this investigation an effort was made to measure the temperature developed at the cutting edge of a cast-alloy cutting tool. To determine tool temperature, a 1/16-in. hole was drilled on the tool axis to a depth of ½ in. from the cutting end of the tool. This hole was enlarged to ⅛ in. for the remainder of the tool length.

Into this hole a thermocouple was brazed and connected to an automatic recording thermometer. It was realized that placing the thermocouple about 3/16 in. from the cutting edge would result in readings lower than actual temperatures developed at the cutting edge. But the charts did give a good indication of the heat developed.

Fig. 4 is an idealized graph of temperature developed in cutting the steel in these tests with cast-alloy tools at 200 sfpm. and a 0.125 x 0.030-in. chip area. As one would expect, the tool heats rapidly as the cut starts, and then continues to heat at a slow rate. Then with no visual indication in the tool or work, the tool starts to cool slowly because it loses size but so slightly as to be invisible to the eye. Change in size could, however, be detected by measurement when the cut was finished.

Shortly after this change begins, the tool loses heat rapidly, a condition that can easily be detected by eye and ear and indicates tool failure. These conditions were noted on about 100 tools tested with recorded cutting temperatures.



Preferred is the Modified Ostwald Viscosimeter for determining the true viscosity of a hydraulic oil, because direct readings in centistokes are obtained. The Saybolt instrument is useful only over a small viscosity range and results must be converted to centistokes with a chart for accuracy. *Illustrations from SAE Handbook*

What to Look for in Hydraulic Oils—II

VISCOSITY...

BY ANTHONY J. ZINO, JR.
LUBRICATION ENGINEER

FIRST and most important task in selecting a hydraulic oil for a specific circuit is determination of proper viscosity to be used at a specified temperature. Transmission and maintenance of fluid power at maximum pressures within a circuit are directly dependent upon the internal resistance that the viscous oil film offers to leakage. This internal resistance of the hydraulic fluid is generally termed its viscosity.

Viscosity is a physical property of an oil. It is a measure of the oil's internal resistance to shear or flow at a definite temperature and pressure. Its present definition is basically founded on Newton's law for fluid flow wherein the shearing stress is directly proportional to the rate of shear.

Expressed in scientific terms (metric system), the absolute viscosity of a fluid is that force required to move a plane surface 1 sq. cm. in area over another plane surface at a velocity of 1 cm. per sec., when the two surfaces are separated by a layer of fluid 1 cm. in thickness; i.e., dyne-seconds per square centimeter. In deference to Poiseuille, who established the equation upon which our present-day viscometers are designed, this unit is termed a poise. The term most commonly used is the centipoise which is 1/100th of a poise.

There is only one oil viscosity that gives optimum results in a given hydraulic circuit. It is not safe to base the recommendation on pump builder's data alone

According to Poiseuille's formula, the absolute viscosity of a fluid in a capillary tube under viscous flow can be determined as follows:

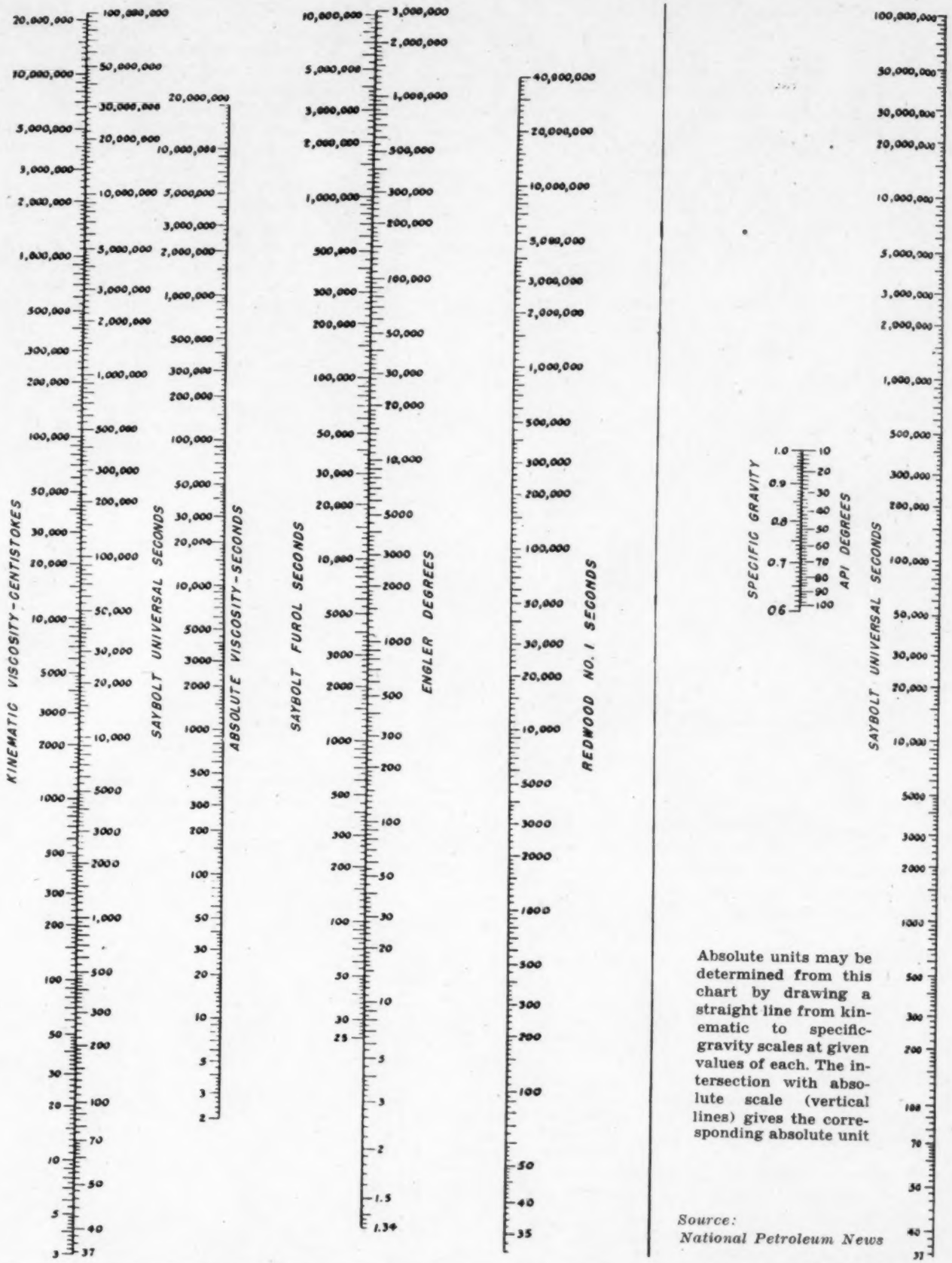
$$u = \frac{\pi \times r^4 \times g \times d \times t \times h}{8 \times v \times l}$$

u = absolute viscosity
g = acceleration due to gravity
t = time in seconds
v = volume of fluid
r = radius of capillary bore
d = density of fluid
h = average head
l = length of capillary bore

Although the absolute viscosity of a fluid is scientifically expressed in poises, a definite relationship exists between absolute viscosity of a fluid and its density. So it is more convenient to determine and express viscosity in units other than Poises. It is evident that in Poiseuille's equation, the absolute viscosity is the product of the fluid's density and the ratio $\frac{\pi \times r^4 \times g \times t \times h.}{8 \times v \times l}$

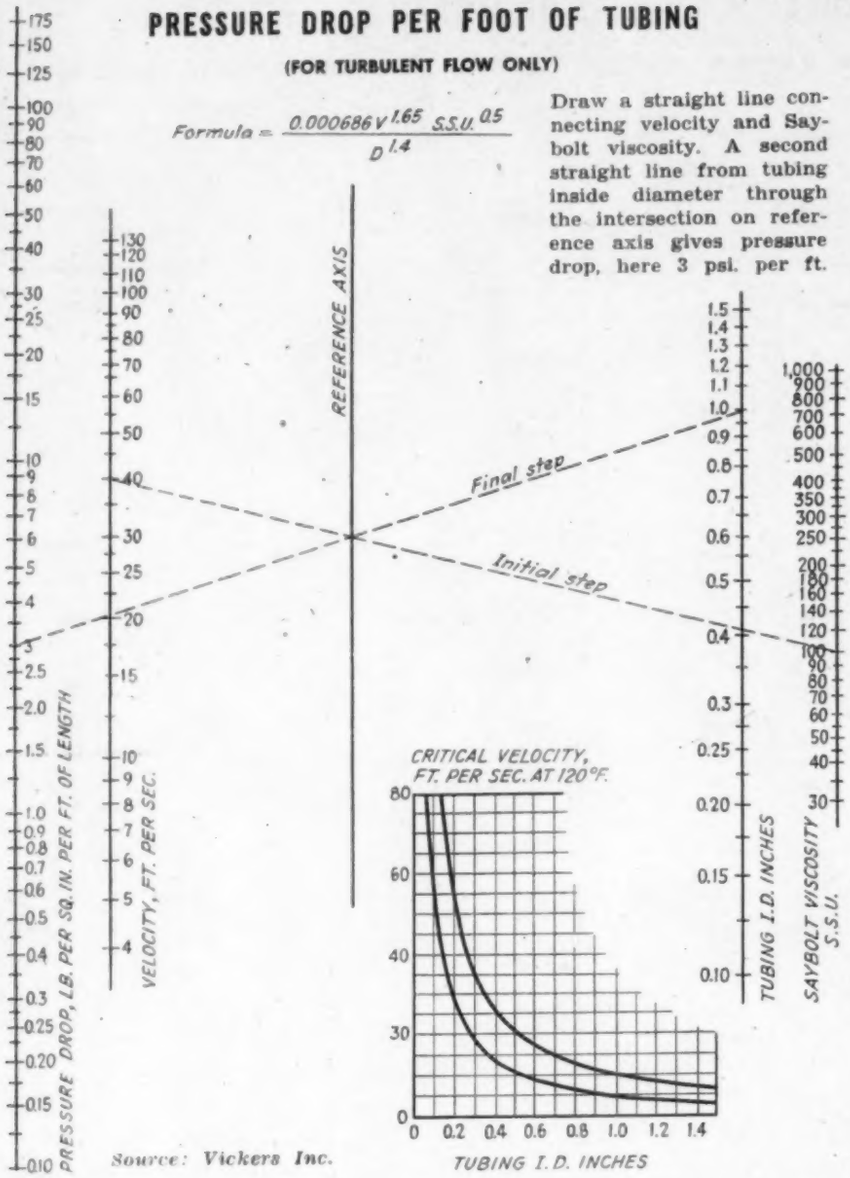
VISCOSITY CONVERSION CHART

FOR TRANSLATING READINGS OF VARIOUS VISCOSIMETERS INTO TERMS OF ABSOLUTE VISCOSITY



Absolute units may be determined from this chart by drawing a straight line from kinematic to specific-gravity scales at given values of each. The intersection with absolute scale (vertical lines) gives the corresponding absolute unit

Source:
National Petroleum News


PRESSURE DROP PER FOOT OF TUBING
(FOR TURBULENT FLOW ONLY)
Formula = 0.000686 V 1.65 S.S.U. 0.5 / D 1.4
Draw a straight line connecting velocity and Saybolt viscosity. A second straight line from tubing inside diameter through the intersection on reference axis gives pressure drop, here 3 psi. per ft.
REFERENCE AXIS
Final step
Initial step
PRESSURE DROP, LB. PER SQ. IN. PER FT. OF LENGTH
VELOCITY, FT. PER SEC.
TUBING I.D. INCHES
SAYBOLT VISCOSITY S.S.U.
CRITICAL VELOCITY, FT. PER SEC. AT 120°F.
TUBING I. D. INCHES

Source: Vickers Inc.

As this latter ratio is termed the fluid's "kinematic viscosity," Poiseuille's equation can be made to read—

Absolute viscosity = Density × kinematic viscosity

or

$$\text{Kinematic viscosity} = \frac{\text{Absolute viscosity}}{\text{Density}}$$

The absolute metric unit of kinematic viscosity is centimeters—squared per second. This unit is called the "Stoke" in honor of the English scientist, Sir George Stokes. The unit centistokes is more commonly used and is 1/100th of a stoke.

Evaluation of Viscosity

The instruments used for determining viscosity are known as viscometers or viscosimeters. These instruments consist essentially of a capillary tube through which a fluid may flow under such conditions that the constants in Poiseuille's equation can be easily evaluated or established.

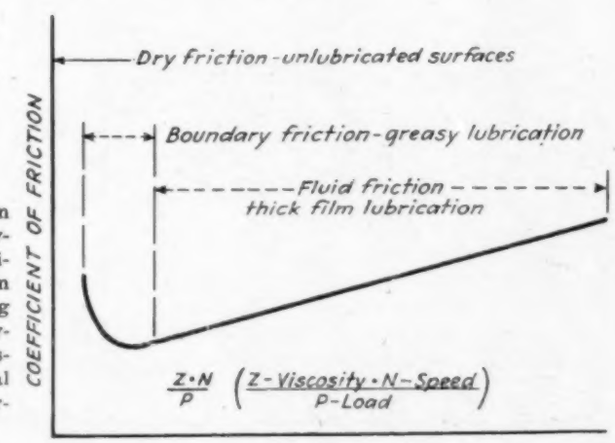
Such an instrument is the Modified Ostwald Viscosimeter. It is one of the most widely used instruments for determining the kinematic viscosity of a fluid. The method employed for determination of kinematic viscosity is described in A.S.T.M. Test; D445-46T. The viscosity of the fluid in centistokes is obtained directly by multiplying the efflux time by the viscosimeter constant.

Another instrument, commonly used for determination of viscosity in the United States, is the Saybolt Universal Viscosimeter. This instrument has limitations and does not determine the kinematic viscosity directly in centistokes.

For accurate work and particularly with fluids of low viscosity, it is advisable to use the Modified Ostwald Viscosimeter or similar capillary viscosimeter. The Saybolt Universal Viscosimeter only determines the *time* in *seconds* for 60 cubic centimeters of fluid to flow through a calibrated orifice at a *definite temperature*. The "viscosity" so obtained is not the true viscosity, as defined, and is only proportional to the kinematic viscosity for a definite range of viscosities. Viscosity, as obtained by this instrument, is expressed as Saybolt Universal Seconds (S.U.S.). Method of determining S.U.S. is described by A.S.T.M. Test D-88-44.

Where viscosity has been determined by the Saybolt method, it can be converted and more accurately expressed in centipoises or centistokes. Formulas and charts have been devised for this purpose; for example, the viscosity conversion chart published by *National Petroleum News*. Conversion is a matter of seconds with this chart (preceding page). The method is:

A straight line perpendicular to the scaled lines of the chart indicates equivalent units of the kinematic, Saybolt Universal, Saybolt Furol, Engler, and Redwood No. 1


Dry friction - unlubricated surfaces
Boundary friction - greasy lubrication
Fluid friction - thick film lubrication
COEFFICIENT OF FRICTION
Z·N/P (Z - Viscosity · N - Speed / P - Load)

With an increase in viscosity of the hydraulic oil, the coefficient of fluid friction rises, thus affecting efficiency of the hydraulic circuit, as disclosed by the general journal bearing performance chart

scales, at any common temperature. Absolute units are determined by drawing a straight line across the kinematic and specific gravity scales at given values of each, the intersection with the absolute scale indicating the corresponding absolute unit. Another chart that can be used for this purpose is given in the A.S.T.M. "Method for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity"—D446-39.

Importance of Viscosity

Our interest in viscosity characteristics of hydraulic oil lies in its value for controlling fluid frictional losses, as well as ability to act as a sealant. As will be brought out more fully in Section VI—Lubricating Value, certain types of friction exist wherever the hydraulic fluid is required to perform as a lubricant. The general journal bearing performance chart illustrates the various types of friction by plotting coefficient of friction against speed, load and viscosity.

This chart discloses that viscosity is of major importance in the region of hydrodynamic lubrication or fluid friction. In this region, the metal surfaces are considered to be perfectly lubricated; that is, completely separated by an unbroken film of lubricant. With all other conditions remaining constant, development of friction and heat is entirely dependent upon any change in viscosity. Friction and temperature rise in this region are unaffected by either the surface condition of the metals or the chemical nature of the fluid.

The importance of viscosity in controlling frictional losses or pressure drops in hydraulic tubing is evident from the accompanying nomograph on facing page. Approximate frictional losses can easily be determined. For example, with 1-in. I.D. tubing and fluid velocity of 40 ft./sec., an

Pump Manufacturers Recommendations for Hydraulic Oils

GEAR-TYPE PUMPS

Manufacturer	Operating Temp.	Viscosity at 100 F.
Brown & Sharpe Mfg. Co.		
Spur, spiral bevel, herringbone gear pumps	None Specified	150-300 S.U.S.
Gerotor May Corp.		
Gerotor external-interal gear pumps	120-140 F.	250-300 S.U.S.
Hydraulic Press Mfg. Co.		
Hydro-Power gear pumps	—	950 S.U.S.
Northern Pump Co.		
Series 4000 pumps:		
Small	—	300 S.U.S.
Large	—	500 S.U.S.
Geo. D. Roper Corp.		
Series F and H rotary gear pumps	180F. Max.	200-300 S.U.S.
Sundstrand Machine Tool Co.		
Type WX Rota-Roll Pump	120F. Preferred	155 S.U.S.

AXIAL-PISTON PUMPS

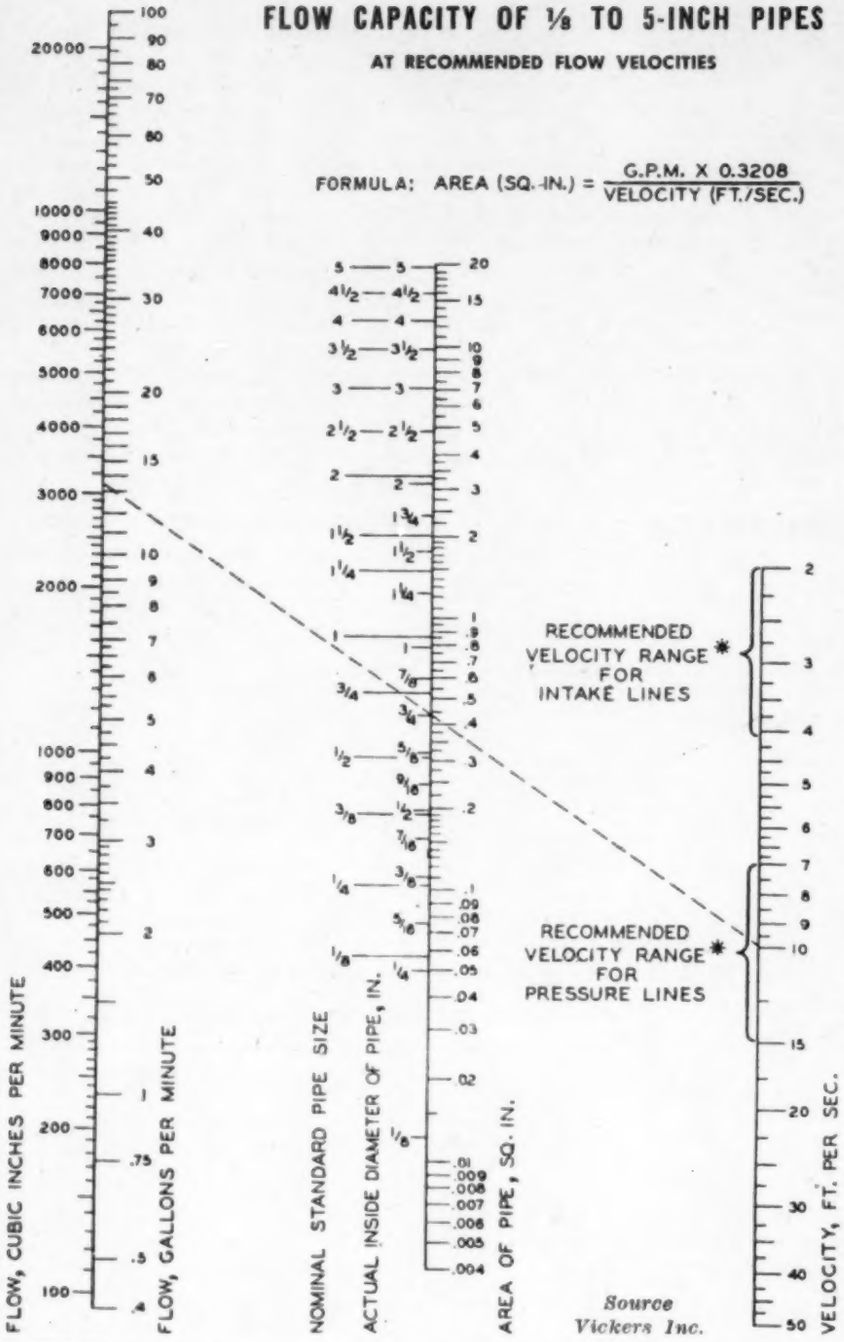
Manufacturer	Operating Temp.	Viscosity at 100 F.
Denison Engrg. Co.		
High-pressure, high-volume, constant-displacement Type 3500 series	Preferred: 110-130F. Maximum: 150F.	250-300 S.U.S.
LaPointe Machine Co.		
Variable and reversible discharge pumps	Preferred: 130F. Maximum: 150F.	200-210 S.U.S.
Northern Pump Co.		
Axial parallel-piston, Series 7000	Maximum: 160F.	450-650 S.U.S.
Vickers Inc.		
Variable-delivery, piston-type fluid motor	Above 500 lb./sq. in. pressure	
	50-90F.	315 S.U.S.
	Below 500 lb./sq. in. pressure	
	—	225 S.U.S.
	Maximum operating temp: 155F.	
Waterbury Tool Co.		
Variable-speed transmission and variable-stroke pump	Preferred: 120F. Maximum: 150F.	320 S.U.S.

VANE-TYPE PUMPS

Manufacturer	Operating Temp.	Viscosity at 100 F.
Racine Tool & Machine Co.	Above 60F.	200 S.U.S.
Rotary-vane type, variable displacement	Below 60F. Maximum operating temp. 160 F.	75 S.U.S.
	Ambient Temp. 50-90F.	
Vickers, Inc.		
Rotary-vane type, constant displacement	Pressures above 500 lb. sq. in.	
	with flow control valves	150 S.U.S.
	Without flow control valves	225 S.U.S.
	Pressures below 500 lb./sq. in.	
	With flow control valves	100 S.U.S.
	Without flow control valves	150 S.U.S.
	Optimum operating temp. 135F.	
	Maximum operating temp. 155F.	

RADIAL-PISTON PUMPS

Manufacturer	Operating Temp.	Viscosity at 100 F.
American Engineering Co.	Pressures below 1500 lb./sq. in.	
Hele-Shaw pump	Below 100F.	525 S.U.S.
	Pressures above 1000 lb./sq. in.	
	Maximum: 100F.	860 S.U.S.
	Pressures above 1500 lb./sq. in.	
	Minimum: 100F.	1250 S.U.S.
	Note: Minimum viscosity: 600 S.U.S. at operating pressure and temperature preferred	
Hydraulic Press Mfg. Co.		
Hydro-Power radial pump	Preferred: 90-100F. Maximum: 125F.	900-1000 S.U.S.
Northern Pump Co.	Maximum: 155F.	650 S.U.S.
Series 5000		300-350 S.U.S. min. at oper. temp.
Oilgear Co.		
Variable-displacement pumps and motors:	Max. preferred operating temp.-140F.	
Type F —to 10 hp.	55 to 170F.	550 S.U.S.
	40 to 70F.	300 S.U.S.
Type C or D—100 or 150 hp.	55 to 170F.	550 S.U.S.
	40 to 140F.	300 S.U.S.
Type C or D—up to 60 hp.	40 to 160F.	300 S.U.S.
	25 to 135F.	150 S.U.S.
Superdraulic Corp.		
Constant- and variable-delivery pumps	Oil inlet temp: Max.—120F. Optimum—90-100F.	150 S.U.S.


FLOW CAPACITY OF ⅛ TO 5-INCH PIPES
AT RECOMMENDED FLOW VELOCITIES
FORMULA: AREA (SQ. IN.) = G.P.M. X 0.3208 / VELOCITY (FT./SEC.)
FLOW, CUBIC INCHES PER MINUTE
FLOW, GALLONS PER MINUTE
NOMINAL STANDARD PIPE SIZE
ACTUAL INSIDE DIAMETER OF PIPE, IN.
AREA OF PIPE, SQ. IN.
RECOMMENDED VELOCITY RANGE * FOR INTAKE LINES
RECOMMENDED VELOCITY RANGE * FOR PRESSURE LINES
VELOCITY, FT. PER SEC.
Source
Vickers Inc.

* *Recommendations are for oils having a maximum viscosity of 315 S.S.U. @ 100° F., operating at temperatures between 65° F. and 155° F.*

increase in the fluid's viscosity from 100 S.U.S. to 300 S.U.S. at 100 F. results in a pressure loss increase of 2 lb. per sq. in. per ft. of hydraulic tubing.

Frictional or pressure losses created by conditions conducive to turbulence, as well as by excessive shearing stresses, are also governed by the viscosity characteristics of the hydraulic fluid. Consequently, it is not difficult to understand why there is one *and only one* viscosity that will give optimum results for a given circuit. The selection and use of a hydraulic fluid with too low a viscosity is usually reflected in increased oil leakage, inability to hold pressure, lack of positive hydraulic control, and lower volumetric pump efficiency or increased pump slippage. On the other hand, too high a viscosity will result in an increased pressure drop throughout the circuit, higher oil temperatures, sluggish hydraulic operation and lower mechanical efficiency.

Pump Requirements

The "heart" of any hydraulic circuit is its pumping unit. Basic viscosity requirements have already been established by pump manufacturer (see table). But since he is not always familiar with the over-all conditions in a hydraulic circuit in which his pump will be used, these data should be used only after a careful study has been made of all other factors. It is possible that the circuit must have an oil other than that designated for the pump alone.

Part III—Viscosity Index will be discussed in an early number.

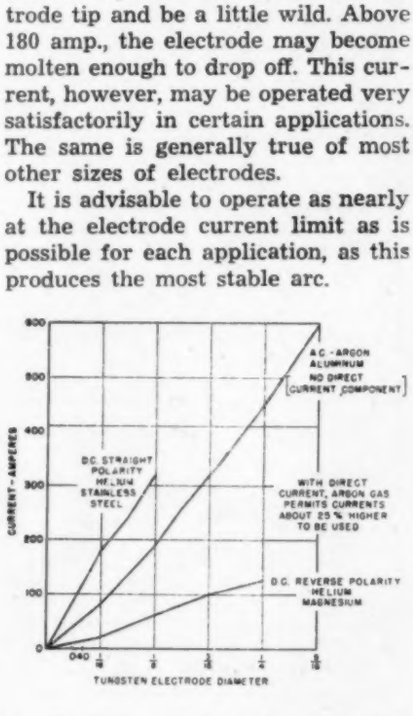
Chart Selects Weld-Current Levels

FACTORS that affect the current-carrying capacity of a particular size of tungsten electrode, according to General Electric welding engineers, are the electrode extension from the gas nozzle and collet; water cooling, if used, and its distance from the electrode; type and flow of shielding gas; type of joint and material to be welded; and type of welding, whether manual or machine.

The chart shows current levels that have been used for manual welding in the G. E. welding laboratory for several years, and gives current levels for each electrode size. Values are very flexible. Tungsten 1/16 in. in dia., for example, will operate satisfactorily on straight polarity dc. with helium gas on stainless steel from 100 to 180 amp.

Below 100 amp., the arc may have a tendency to wander on the electrode tip and be a little wild. Above 180 amp., the electrode may become molten enough to drop off. This current, however, may be operated very satisfactorily in certain applications. The same is generally true of most other sizes of electrodes.

It is advisable to operate as nearly at the electrode current limit as is possible for each application, as this produces the most stable arc.


CURRENT - AMPERES
AC - ARGON ALUMINUM NO DIRECT CURRENT COMPONENT
DC STRAIGHT POLARITY HELIUM STAINLESS STEEL
WITH DIRECT CURRENT, ARGON GAS PERMITS CURRENTS ABOUT 25% HIGHER TO BE USED
DC REVERSE POLARITY HELIUM MAGNESIUM
TUNGSTEN ELECTRODE DIAMETER

TALKING SHOP

Formula

THAT ANCIENT WHEEZE about mathematicians making mistakes in arithmetic is verified regularly by hopeful authors, who proudly report that a new process cuts cost or time "100%." Too bad percentages couldn't have been legislated equal above and below 100. Then a doubling of production (up to 100% or at 200% the previous rate) would be the same percentagewise as halving cost (down 50%). Reminds us of the group of marketing experts who couldn't make a store pay. They sold it at a loss to a non-expert who'd been running stores all his life, only to see him double its size annually for several years, obviously from profits. Finally, they went to him and asked: "How could we marketing experts fail while you, unlettered and unread, succeed?"

"It's simple," the old fellow said, "I just make sure I make my 1% profit on every sale. I buy for $1 and sell for $2."

Change Speed, Hold Feed

TO ASSURE uniform precision threads, one tool builder has applied positive screw feed to multiple tapping-machine heads. But each head has taps of several different pitches. Separate gearing for each tap makes it possible to alter its speed of rotation so its advance matches that of the lead-screw-fed head. Thus all tapping can be done in one operation.

Pre-Axis Incident

STEEL DETECTORS are used at plant gates by explosives companies to stop entrance of spark-producing metal and by metalworking companies to stop exit of expensive tools and small parts. They remind us of a yarn told us by the baron who represented Austria at the ASME 50th Anniversary festivities in 1930. It seems a group of Jap engineers were visiting the Jena, Germany, works of Carl Zeiss. They were told that they could see all operations, but neither notes nor photos could be taken.

But Zeiss officials noticed some Japs were taking surreptitious snaps with "secret" buttonhole cameras. So, after the inspection trip, the visitors were invited to see some brand-new movies of special Zeiss processes. The visitors delightedly accepted. While they watched, however, Zeiss men projected X-rays through the room—just as effective as exposing the camera films to strong sunlight and not in the least embarrassing.

All Details—Almost

SOME YEARS AGO, we made quite a "scoop" by publishing the first hookup diagram for a very tricky automatic control. We couldn't understand it, but it came direct from the inventor and many readers were duly impressed. A year or more later, we found an apparent flaw in the hookup—didn't seem to work somehow. When we asked the inventor for clarification, he chuckled: "It's *almost* right. But had I drawn the whole hookup exactly, anybody could use it without consulting me. There's no profit in that!"

Reminds us of the Clyde shipbuilder asked in the meager Thirties to quote on a Jap merchant vessel. In due course he was notified that his bid was acceptable, but detailed plans were required before final contract. He supplied the plans—and the deal never materialized.

Some three years later, a freighter was launched at a Jap shipyard. It looked strangely like the Scottish plans. And when it was launched, it turned turtle and sank.

Uncanny, these canny Scots.

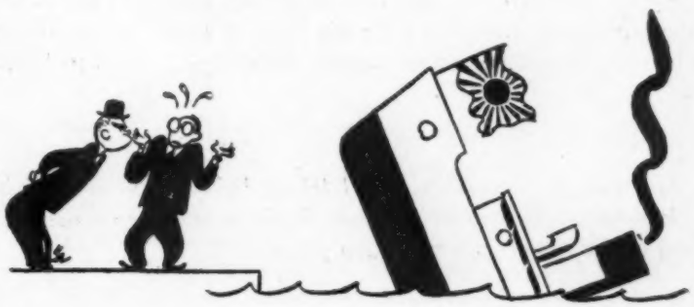
Move Over, M.D.'s

THERMOMETERS may become standard machinist-bib decorations, as a result of the trend to non-ferrous materials. Heat gain in a 10-in. dia. aluminum workpiece, for example, causes major expansion—about 0.014 in. for 20 F. On magnesium, the expansion is even more marked. Thus, a piece that is to size hot is undersize cold. One proposed solution is to add a table showing dimensions at 4 F. steps—but that means the operator must be able to read both a thermometer and a scale, and measurement must be preceded by an inquiry on workpiece temperature. Some states may think that encroaches on doctors' rights.

Exhume Hydraulics

"BURIED" hydraulic systems on some machines are being frowned upon by several motor plants. One engine builder's plant manager pointed out 15 limping machines—all crippled by leaks which could not be repaired until the weekend shutdown. The job on each would require a weekend of overtime maintenance work—enough total work for the whole maintenance crew for a month.

Divisions of another auto builder also chime in on the ban on buried systems, insisting on possibly unsightly, but readily available, piping.



ROUND TABLE

Expert or Executive?

"Hey, Ed, where've you been? And that grease all over your clothes! They gotcha' back running a machine?"

"Can't spend much time with you now, Al. Got to finish a little machine repair before the whistle blows. Had a drill spindle go bad—want to see if we can get by until quitting time."

"I know what you're talking about, but this sort of thing seems to be happening right along. Pretty soon you'll be spending full time on machine repair. You don't have to do all that work, you know. A smart foreman doesn't have to know all that mechanical detail."

"There we go again. If a foreman don't know every job in his department and ain't able to do it, what will his men think? No, Al; wish I could sit at the desk all the time and get someone else to do the work for me, but things just don't turn out that way. You've been spending too much time in those training sessions listening to Hunter spout theory."

"Granted that it's helpful to know something about the mechanics of your work, it still doesn't mean that you're the guy who has to know all the answers, let alone be able to hit peak performance on each skill. The very nature of your job should tell you that you are paid to get the work done, not do it all yourself. Besides . . ."

"Yeah, but how in the world do you get the work done and how do you control it unless you know it all first?"

"Come on now, Ed. You don't mean that. When you think it through, it's easy to see that any supervisor is going to have a tough time if he's forced to set himself up as an expert. That's just the trouble you're having now—spending plenty of time experting, not enough time supervising. What good does it do you to know so much about your work, if you're going to be the one who has to solve all the problems?"

"Maybe so, Al. But I've got another question for you. How could I even teach someone else to handle operating problems, if I didn't know what to tell an assistant or helper?"

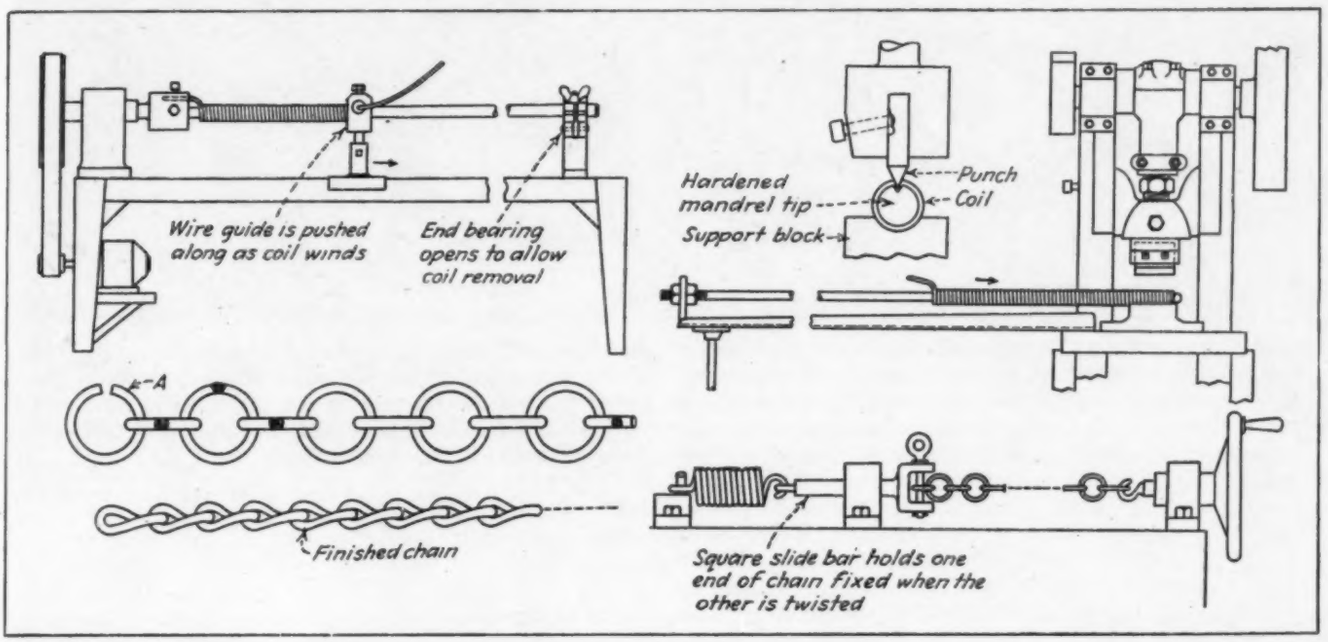
"We don't seem to be getting any closer to agreement on how much a foreman has to know to run his job. But I would like to say this: our inability to see eye to eye seems to stem from a basic difference in our approach to the supervisory job. You think that the foreman has to be a good operator as well as a supervisor. In fact, your idea amounts to the point that the foreman is a glorified mechanic."

"On the other hand, Ed, my idea is that a foreman's job calls for a different set of skills altogether. Call 'em managerial skills if you want to. Any mechanical ability is more a matter of smart allocation and assignment to others."

"Very fine, Al, but why not be a realist? Here it is five minutes 'til the whistle—one of my machines is down—no one else knows how to fix it—we need the job—the boss is waiting for the work. What's your answer? I can fix it—should I or shouldn't I? Allocation or assignment's not much help when the chips are down. Seems to me that it's a good thing I know quite a bit about mechanics right now."

***SHOULD A FOREMAN PITCH IN**—or be able to—on any job? Or is it more important that he know how to handle men while others do the work? Your ideas and opinions will help others. Discussions of earlier topics appear on later pages.*

Practical Ideas


Wire guide is pushed along as coil winds
End bearing opens to allow coil removal
A
Finished chain
Hardened mandrel tip
Punch
Coil
Support block
Square slide bar holds one end of chain fixed when the other is twisted

How We Made Twisted-Link Welded Steel Chains

During the war we had to handle odd and unfamiliar jobs occasionally. One such concerned the making of several thousand lengths of chain from 10-gage mild steel wire. Each chain consisted of about twenty links. After a few experiments the following procedure was settled upon as best calculated to yield rapid production with the equipment available.

The wire was first formed into long close-coiled springs using a motorized winding device. The coils, about 8 ft. long, were transferred to a punch to convert them to separate split rings. This setup included a mandrel over which the coil was slipped so the wide chisel-punch could cut several inches of coil with each stroke.

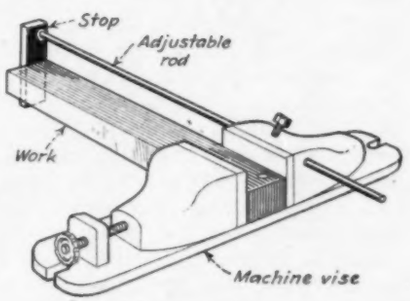
Linking together and welding proved easy enough. The difficulty came in forming the assembled to chain to final shape. We tried forming the links prior to welding; we tried forming the assembled chain in dies but neither method gave satisfactory results.

The final solution, although it seemed the least likely at first, was to twist the whole chain through enough revolutions to give each link its 90° twist. A frame was assembled with a square-shanked clevis at one end, to hold one end of the chain fixed, and a crank at the other end. The square shank was connected to a tension spring, allowing the chain to gain in length as the links were flattened while maintaining a uniform tension. This method of twisting produced more uniformly twisted links than previous attempts, and eliminated other defects as well.

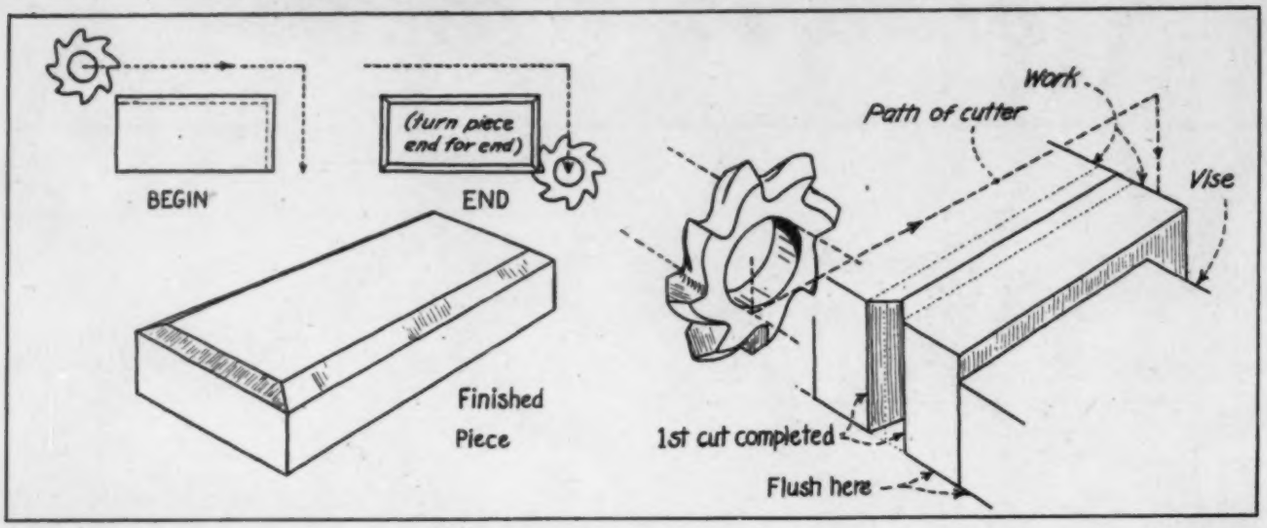
A 100% test was specified to determine weld soundness, but as long as the twisting operation imposed stresses on the chain considerably in excess of any service requirement, the separate test was eliminated. *S. Framurz, Bombay, India.*

Drill Your Oil Grooves

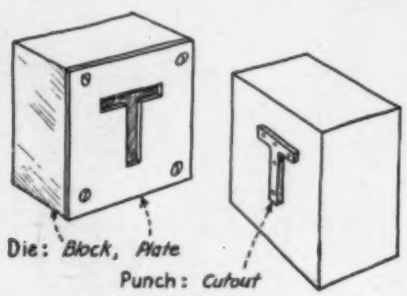
Oil grooves in bearing surfaces of all kinds can be drilled much faster than the usual hand-chiseling or milling. Internal grooves in sleeve bearings are made by inserting a temporary plug of the journal diameter, then drilling, half in the bearing and half in the plug. Grooves in flat surfaces are made merely by clamping on a temporary block and repeating the above drilling operation. For production work, the plug can be case-hardened and used indefinitely. *N. Malmgren, Chicago, Ill.*



Vise Stop—A hooked rod or a rod with a small plate bolted to one end, when fitted through a hole parallel to the jaws of a drill vise makes a convenient length gage when repetitive work is encountered. *Francis Amers, Cedar Rapids, Iowa.*



FAST CHAMFERING METHODS—Brass rectangular plates had to be beveled 45° all around in considerable quantity so we mounted them, 2 at a time in the miller vise with one end flush with the vise. Horizontal and vertical table stops were set so the cutter would pass over the tops of the two pieces, exactly centered, and at correct depth. At the end of the horizontal cut, vertical feed was engaged and the cutter finished the far end of the pieces. The work was turned end for end, the operation repeated, and that's all. *Bernard Levowich, Dorchester, Mass.*

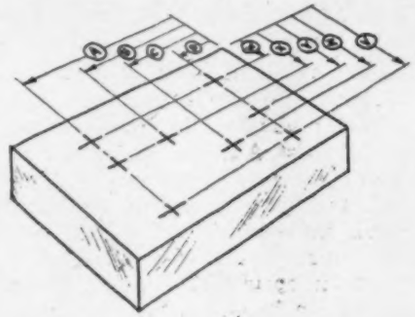


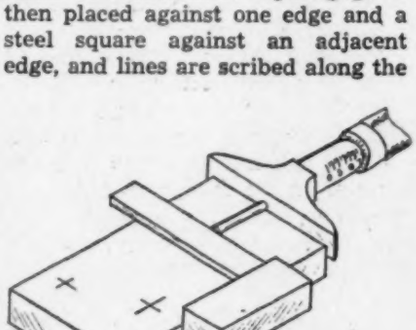
Built-Up Dies Save Money

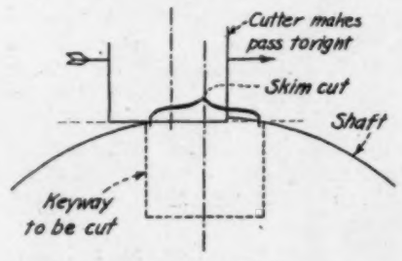
Embossing dies can be built-up from plate stock with excellent results at far less cost than when cut in the solid. The design to be stamped is traced twice. One layout is made oversize and the other undersize, or at least, one is bigger than the other by the thickness of the stamping stock regardless of the base dimension. Both blanks can be sawed in a bandsaw or burned, whichever is easier. The larger outline will be the die so the cutout is thrown away, while the smaller cutout, which will be the punch, is saved and the trimming discarded. The stock from which the punch is cut should be thinner than the die stock by the work thickness, too.

Both pieces are then rounded and given whatever draft or taper is desired, and hardened. These finished plates are then mounted on solid blocks by means of previously drilled and countersunk holes in accurate alignment for the press operation. *Raymond F. Ball, Utica, N. Y.*

Miked Layouts—Small rectangular blocks requiring accurate hole spacing can be laid out using the coordinate method in the following way. Dimensions from the drawing are converted into measurements from two edges of the piece in tabular form. A micrometer depth gage is then placed against one edge and a steel square against an adjacent edge, and lines are scribed along the square according to the dimensions tabulated. The tools are then turned and the operations repeated for the coordinate dimensions. Such a layout, if made with reasonable care, should be well within 0.010 in. which is all you can expect of scribing, but has the advantage of being fast and requiring no eye strain. After prick punching and pilot drilling, plugs will be required to show up errors in spacing and alignment, enabling corrections to be made in several stages. *George A. Filepas, Steelton, Penna.*

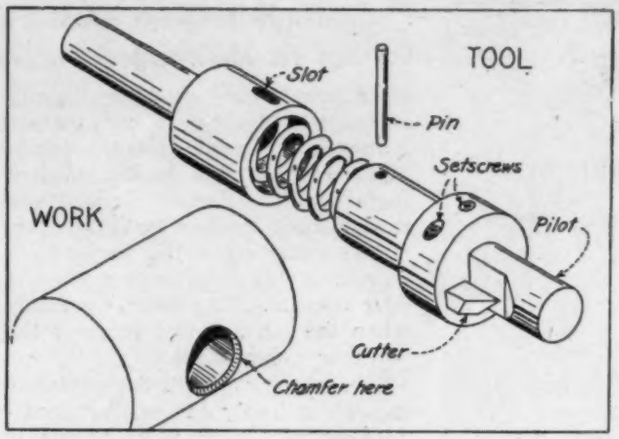






Centering a Keyway—Many complicated and involved ways of centering a cutter on a piece of shaft have been devised. These are accurate enough, but slow. Here is a quick way which gives accuracy, yet requires no measuring at all.

Set the cutter so it just grazes the shaft, then, raise the table a few thousandths at a time, depending on the cutter width and the shaft diameter, and take successive passes until a flat is obtained approximately the same width as the desired slot. It is now easy to center the cutter by eye directly over and touching the flat just produced. *Michael Axler, New York, N. Y.*



Reciprocating Countersink Burrs Cylindrical Work

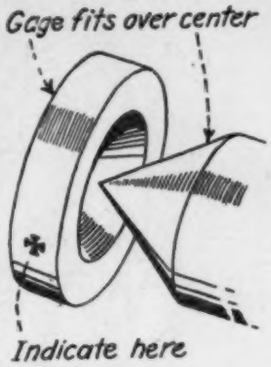
The intersection line of two cylinders produces a circularly curved ellipse, as any tinsmith will tell you. In this case, one of the cylinders is imaginary, as it "consists" of a hole drilled through a piece of round bar. We had to burr and chamfer both ends of this hole on a lot of pieces. (A common parallel of this job would be the burring of wrist-pin bores in engine pistons.)

A very successful solution was obtained by making a floating countersink, piloted in the bore itself, and held against the bore uniformly with a stiff helical spring. The countersink toolholder holds the bit off-center and a setscrew through the periphery locks the bit in place. The pilot is relieved on the sides to clear the bit. The toolholder shank slips in a socket in the tool arbor while a pin, passing through everything, keys the toolholder, preventing it from turning but allowing enough longitudinal motion to suit the job.

A steel ball can be press-fitted diametrically opposite the bit in the toolholder face (this must be accurate) to contact the work exactly opposite the cutter, assuring uniformity at the end of the cut, and preventing too deep a cut. *Dana J. Mulholland, Newport, R. I.*

Re-threading Pipe—Second-hand or broken pipe requiring new threads often give difficulty both in threading and in use because of the hardness and brittleness due to cold working. This condition can be remedied by heating the end to be threaded with a blow torch to a dull red and allowing to cool. This annealing treatment will remove all previous stresses by annealing, allowing perfect threads to be cut without danger of breakage. *J. P. O'Connor, Revere, Mass.*

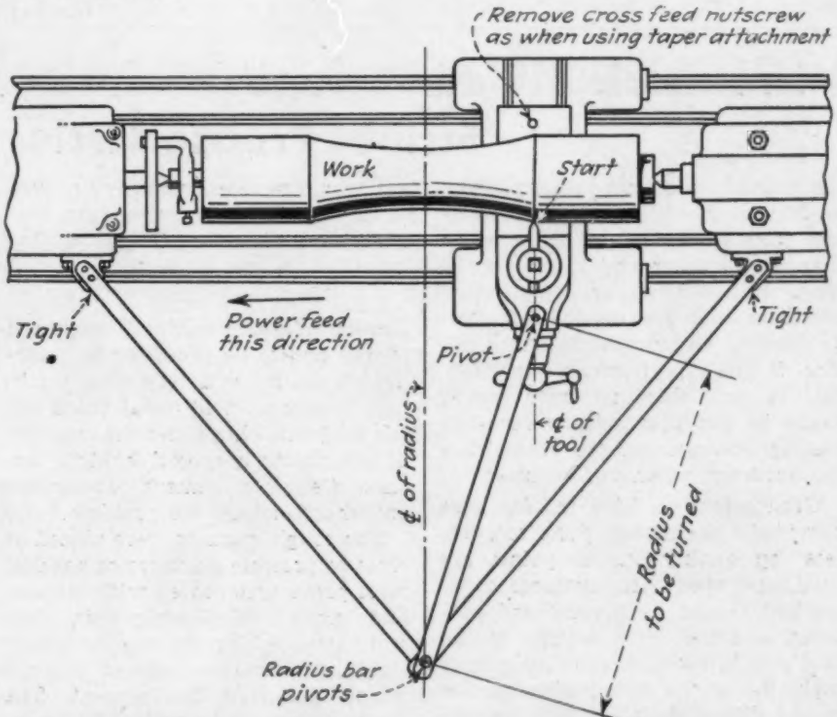
Cone Gage Sets Tailstock



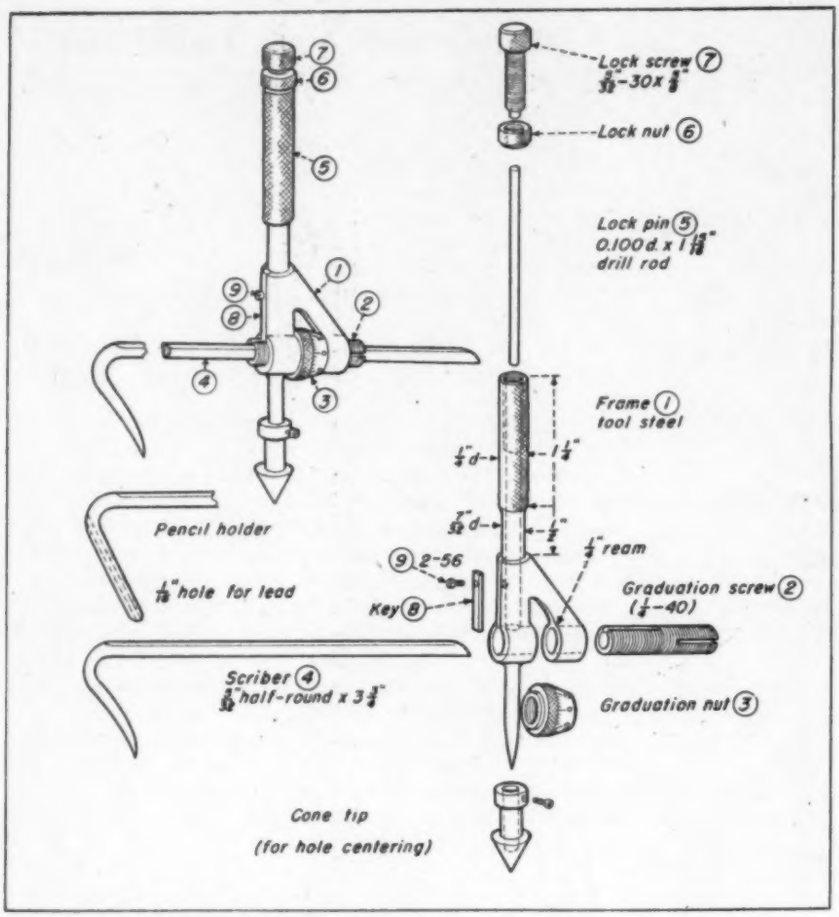
Aligning bars and trial cuts are eliminated and straight as well as any degree of taper turning is possible with this simple tailstock set-over adjuster gage. All it is is an accurately turned, bored and ground ring with a 60° conical hole to slip against either lathe center.

To use the device, place it against the headstock center and bring the carriage and the cross feed to such a position that a dial indicator mounted on the toolpost will read zero while bearing on the gage's O.D. Then, roll the carriage down to the tailstock wherever it may be, without disturbing the cross feed setting, and move the tailstock (with the gage held against the center) until the indicator again reads zero.

Tailstock set-over for Morse, and other "self-locking" taper-turning, is accomplished in exactly the same way, by first locking the tailstock and adjusting the center spindle until the inter-center distance is established. (This should be done with the work in position.) This distance should be measured, then reestablished after removing the piece, and the amount of set-over calculated by proportioning the taper-per-foot value. (Of course, the set-over is half the total taper.) *Roy C. Van Kirk, Cincinnati, Ohio.*



LONGITUDINAL LONG RADII TURNED WITH A-FRAME—Corollary to my spherical-turning method (*AM Aug. 28, p. 124*) the movements are here merely reversed. The power longitudinal feed pulls the carriage along while the cross slide moved under influence of the radius bar only. But beware of loose pivots. *Henry George, Pittsburgh, Penna.*



Micrometric Divider-Compass Scribes Precise Circles

Hand dividing instruments can never be furnished with permanent absolute graduations because of the many chances for wear and loss of accuracy. But relative or comparative measurements are needed as often as absolute measurements and a device of this type becomes very useful. In fact, this instrument could easily be provided with a zero-adjusting arrangement to reestablish the accuracy whenever required.

Graduations to 0.001 in. (as here provided) are meaningless, too, unless top quality scriber points are used, and even then, surfaces to be marked should be ground and polished and the mere weight of the tool should be more than enough to make the marks, as anything heavier would distort both the tool and the scribed lines themselves.

Use of the pencil-lead attachment would, of course, be confined to work where 0.01 in. is the maximum accuracy, but even here, the dial nut would save enormously on eyestrain as compared to reading too-finely divided scales. *George A. Giller, Glen Ridge, N. J.*

Ground Washers made of beryllium copper had to be produced in a medium quantity to a very close thickness tolerance. The metal ruled out the magnetic chuck and the quantity didn't justify a special holding fixture. Cellulose cement, obtainable anywhere, solved the problem.

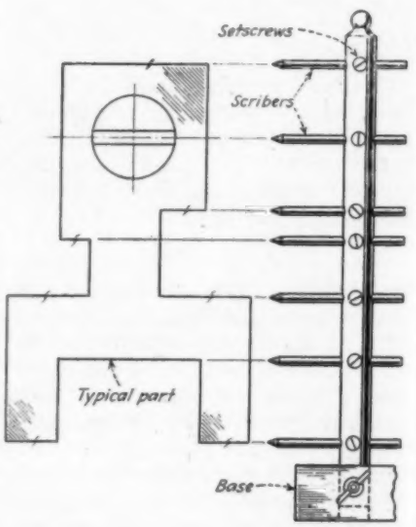
The rough washers were placed as close as possible on strips of parallel steel previously coated with cement, and ground. Following this, they were removed by dipping the whole strip in a shallow pan of acetone which dissolved the cement. The operation was repeated on the opposite side, and with allowance for the steel strip and 0.0003 in. for the film of cement, the washer thickness was held within the desired limits. *Cecil A. Palmer, Vandalia, Ohio.*

Production Height Gage Marks Castings For Machining

Machining sand castings usually means the cleanup of one surface followed by a careful layout, locating everything from the first finished surface. (If elaborate fixtures are used, what follows may be ignored, but in many cases, the device here described will do as good a job and save considerable money, especially when the job isn't too large or the work too complicated.)

This gage was built for performing one and only one job, but modifications can make it adjustable to any job. The large base block holds a vertical ½-in. rod. The rod has been carefully marked off, drilled and reamed to take as many scribers as there will be finished horizontal surfaces (or hole centers) on the casting. Scribers are installed and permanently set. Castings, with one surface machined, are lined up, as many as will fit, on a large surface plate and scribed at one pass of the height gage.

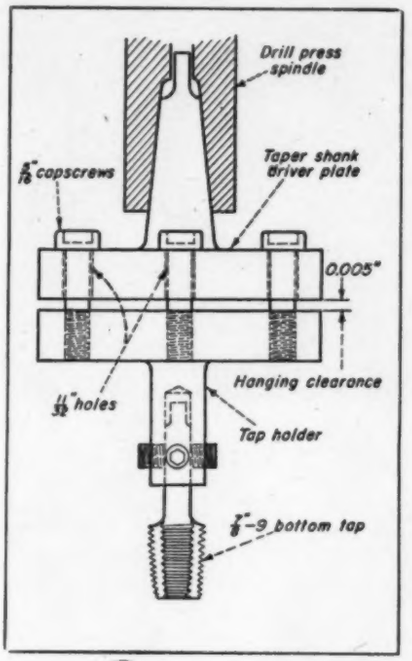
Adjustability could be added by providing clamps like the one described in the preceding issue, and for rough or irregular work where it would be difficult to get uniform marks in many places at once, the scribers should be provided with a telescoping spring arrangement so all would bear on the work with equal pressure regardless of irregularities. *Sam Bendick, Brooklyn, N. Y.*



Duplicate layouts are possible when fixtures aren't justified, by semi-permanently fastening several scribers on a vertical rod stand

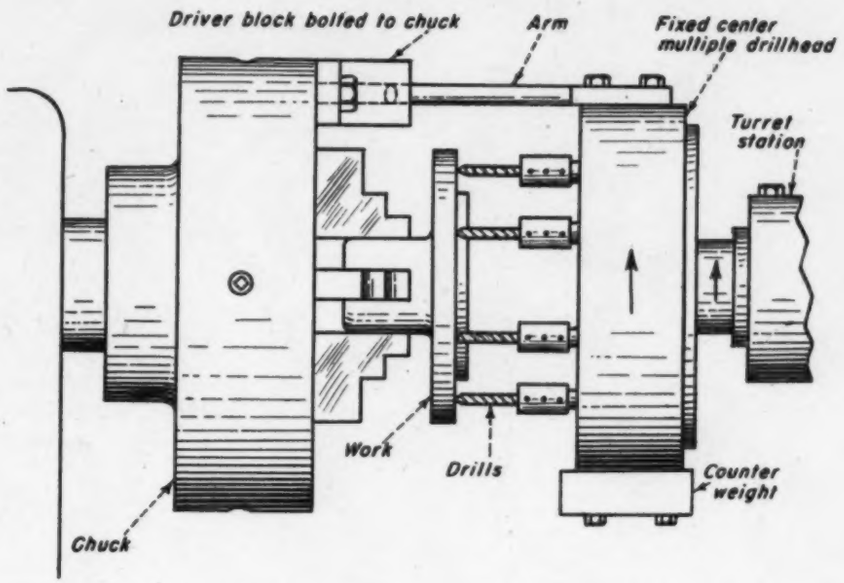
Drillpress Attachment Permits Heavy Tapping Safely

Torque isn't the only thing required in a tapping machine. We tried to tap some ⅞-in. holes but found that the spindle of our drillpress would deflect under the heavy load, causing the hole to be bell-mouthed.



A flexible coupling solved the difficulty. This consisted of a flanged taper-shank driver, carrying three capscrews, and a driven member or tap chuck having three oversize holes to correspond with the screws in the driver. This construction allowed 0.005-in. vertical freedom and 1/32-in. lateral play, enabling the tap to find its own center at all times. *L. S. Rowland, Dallas, Texas.*

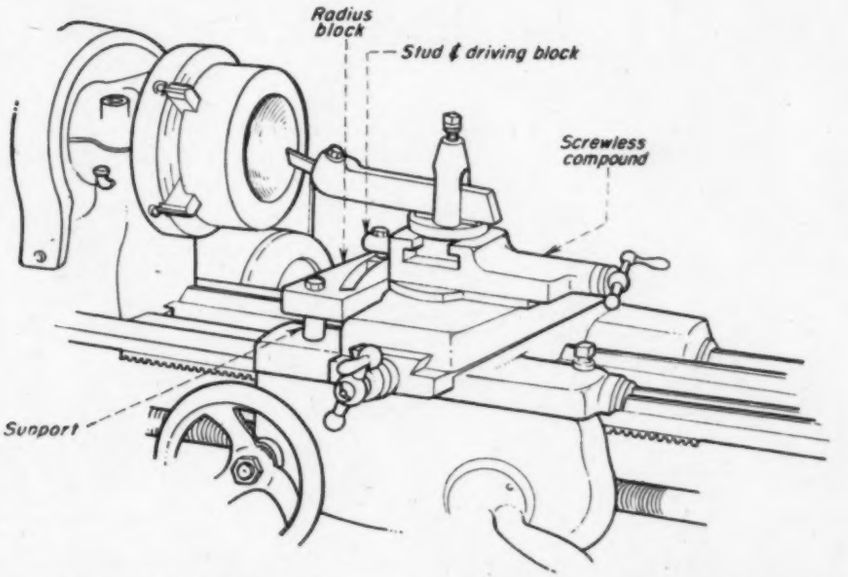
Overhead Drillpress—We had to drill some ⅛ by 36-in. brass sheets, 7 ft. long, each to a special layout. Lacking customary facilities for this size of work, and because the actual drilling was very light, we inverted a small bench drillpress by bolting its base to the ceiling beams directly over a 20-ft. bench. With the drillhead turned over, it could reach any part of the work and its 360° ability to swing minimized moving the plate, too. The long bench allowed a layout man to prepare the next sheet while one was being drilled so steady flow was assured. *Henry George, Pittsburgh, Pa.*



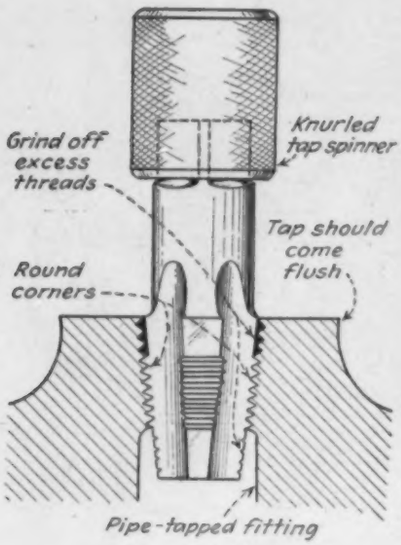
Multiple-Spindle Drillhead Powered By Lathe Faceplate

Production finishing of a certain casting was tooled up as a turret-lathe job. One operation (or step) involved a number of radially spaced holes on one end of the casting, so a multiple drilling head was fastened to one of the turret stations.

When the time to drill the several holes arrived, the drilling head was indexed into position and dogged to the lathe faceplate, so the drilling head then rotated with the work while its spindle remained stationary in the turret. By inverting the relative rotation this way, the driving gears perform the same function and the drill spindles rotate relative to the work just the same as though work and drilling unit were stationary. *George W. Dahl, Barrington, R. I.*



SLOTTED LINK GIVES HEAVY-DUTY RADIUS CONTROL—Quantity duplication of spherical or paraboloidal surfaces, concave or convex is possible by bolting a link across the carriage saddle and providing it with a follower block which is attached to the free-sliding compound rest. Depth of cut is regulated with the longitudinal carriage feed and power cross feed does the actual cutting.

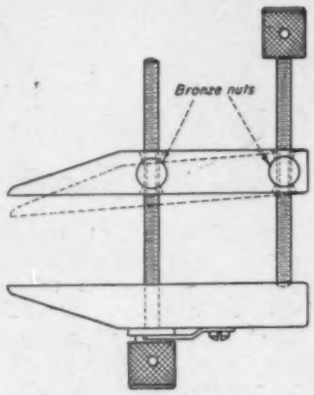


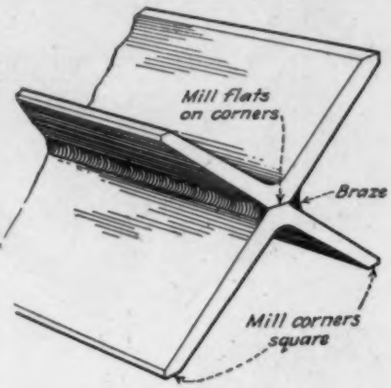
Pipe Gage—To insure uniformity of pipe-tapped holes in production, a handy gage can be made from a discarded tap. Grind away most of the thread, and round the corners on the remaining portion. Equip the old tap with a hand spinner and you're all set. The tap should be ground so the top of the fluted portion comes flush with the top of the hole when the desired amount of thread has been cut. *Robert Dean, Boston, Mass.*

Pivots Allow Toolmaker's Clamp Wide Adjustment

Most toolmaker's clamps have very loosely fitted screws to provide necessary clamping leverage. This construction is poor because the screws and threads, though hardened, are considerably weakened, and the stress is very uneven as well.

This clamp is modified by the addition of large bronze pins which are free to rotate in the hardened steel jaws. The screws work in close-fitting tapped holes through the pins and generously countersunk holes through the jaws give far more flexibility than the former sloppy construction. Bronze was used deliberately as it is durable enough to last a good while, yet easy to replace when worn, whereas the steel parts will wear almost not at all by comparison. *Martin H. Ball, Watervliet, N. Y.*





V-Blocks—Two pieces of angle iron whose corners have been milled as indicated can be welded together into a very useful V-block. When several blocks are wanted, it may be easier to make the X piece long enough to cut into the required sections. *James D. Cuyler, Pelham, N. Y.*

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Thirty-ninth Selection—C. D. Mackinnon's Planer Cuts Circular Arc

NEWS OF METALWORKING

Industrial Unit To Push Boxcar Output Cleared

WASHINGTON—The Office of Defense Transportation, as the first stop toward setting up an industrial advisory committee to help channel steel for full boxcar production, has abated the anti-trust "bogeyman" until next February.

Striving for a production goal of 10,000 freight cars a month, and hampered in achieving it because of unbalanced steel inventories at manufacturers' plants, ODT asked for the formation of a four-industry advisory board to help wipe out the difficulties. Industry was willing, but leary of the anti-trust threat.

In order to set industry's fears at rest, ODT Director J. M. Johnson asked Justice Department to clear the road for the establishment of the committee. Approval was received, with reservations.

In its answer, the Justice Department said it would not institute prosecution under the anti-trust laws for actions taken in the period starting Oct. 27, 1947, and ending Jan. 31, 1948. The letter explained, however, that any pre-existing violation of the anti-trust laws would continue to be subject to proceedings by the department.

Just why the Jan. 13 deadline was set by the Justice Department is not fully known, but it is indicative of general government thinking that by that date Congress will have passed some sort of controls legislation under which ODT's channeling program would fit.

Johnson's outline of the committee showed that it would consist of about 12 representatives of the steel companies, about six from the railroad and private car builders, one from each contract car builder and one or more representatives of specialty manufacturers.

Activities of the advisory group, which started work last week, will consist of establishing production targets for the individual car builders, reporting on inventories of each builder so that unbalanced inventories may be corrected through channeling of steel, and the necessary channeling to furnish materials needed to repair "bad order" cars now unable to operate.

The committee will be headed by an ODT official and will operate only on call by the chairman. No allocation of orders, customers, delivery of cars or business among members of the carbuilding industry will be handled by the group, nor will any request or authorization be made to the steel industry for any limitation or restriction on the production or marketing of steel, ODT reports.

Time Out for golf at the sales convention of the Rudel Machinery Co., at Gray Rocks Inn, St. Jovite, Quebec. Left to right are: William E. Rudel, manager, Boston office, Rudel Machinery, Inc.; J. H. Meyers, sales manager, Lodge & Shipley Machine Tool Co., Cincinnati; H. D. Reimeier, Cincinnati; Thomas R. Rudel, president, Rudel Machinery, Inc., New York

Another Aluminum Shortage Seen

WASHINGTON—Another aluminum shortage, particularly in pig and sheet, is on the way. Although it won't be a sudden thing, the shortage will make itself felt in increasing intensity during the next several months.

The shortage is partially the result of an industry-wide summer production slump caused by electric power shortages, complicated by the closing down of several large basic plants for process changes and rehabilitation. Demand is increasing steadily as new uses of the metal, such as roofing, window sash, sills and frames, are accepted by consumers.

In sheet products the supply situation will tighten somewhat until next spring when a new ALCOA plant in the Midwest goes into production. Placing the plant in operation will affect the pig situation momentarily while the new plant's production pipeline is being filled.

There is still no word on a decision by military stockpilers to lay by aluminum pig metal, although the industry has advocated the proposal. Just how much the stockpiling of pig would affect the supply situation is problematical. It would depend mainly on the amount of electric power available to base metal plants. Another low water-low electrical period in the TVA system would have a material effect on the supply situation.

Surplus of Auto Parts Withdrawn

WASHINGTON — War Assets recently agreed to withdrawal from surplus by Army ordnance of about $80 million worth surplus automotive parts and accessories. Ordnance will re-screen the equipment and retain much of it for its increasing requirements. Culls will be scrapped or re-declared to surplus.

Surplus disposal program under which industry agents handled aircraft components, electronics, cutting tools, and machine tools has been virtually abandoned, due mostly to clearance of inventories suitable for sale at fixed prices. Industry agents sold over $354 million of goods, cost figures.

Five billion dollars of expected $34 billion of surplus will be withheld for military needs, thus reducing WAA's potential inventory to $29.5 billion as of June 1948.

Gaging Business

The Metalworking Industries

Are going into the final weeks of the year with operation well sustained at record levels. Labor is relatively scarce, strikes are few in number, orders are plentiful and materials continue to be a brake on production.

▸ Indications are that the winter ahead will be one of the busiest periods in the history of metalworking.

Machine Tool Demand Steady

Machine tool demand is holding fairly steady. No spectacular buying is being done, but a good volume of orders is in prospect. Conditions are extremely spotty, however. Some builders have comfortable backlogs which will carry them well into next spring, but others are running on lean schedules with little hope of expanding them in the near future.

▸ High costs of labor and materials have made it necessary for at least two prominent builders to announce price increases (of 20%). Other companies are known to be considering further advances as production expenses soar.

Handling Equipment Booming

The delivery situation in most lines of materials-handling equipment is as tight as it was a year ago. Demand appears insatiable. In many cases orders taken today cannot be filled for 10 months to a year.

▸ Industrial heating furnaces and ovens and welding equipment are easier to get than they were. The worst of the rush apparently is over. Builders no longer can keep busy at capacity on the basis of orders flowing in without any noticeable sales stimulus.

Press Orders Stay Near Peak

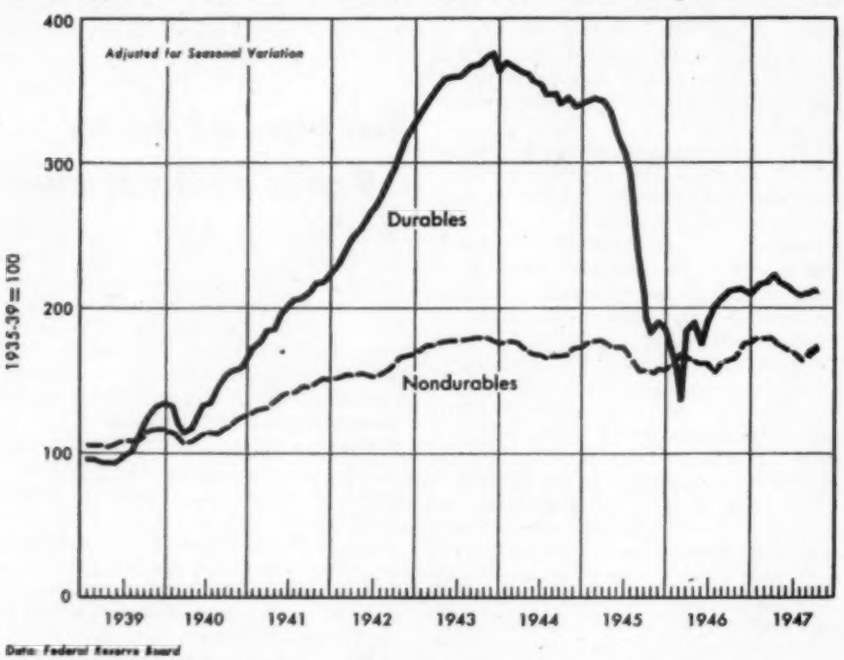
There is a whopping demand for stamping presses. Both mechanical and hydraulic press makers express satisfaction over the size of backlogs. This backed-up business is not as large as it was in 1946, but still represents many months of top production.

▸ The surge of orders for multiple-plunger presses has pushed the delivery date to around 12 months. This sweeping trend has been brought about by the shortage of power presses and by management's realization that it must cut costs on small shells and parts.

Steel Pinch Still in Sheet Items

The situation in raw materials looks about like this: Many steel products are in relatively ample supply, the pinch being chiefly in sheet and strip. Alloys are not doing too well and by some mills are said to be "a drug on the market."

▸ Sheet steel troubles aren't likely to be eased until midyear in 1948. Though production has broken all records, the "push" for deliveries by users is as hard as ever. Shortages of scrap, not to mention sky-high prices, have aggravated the steelmaking problem.



Industrial Production in both durable and nondurable goods, according to the Federal Reserve index, is gradually fighting its way back to the peak which was reached in March. The break in what had been a slow decline from March on regained strength starting in early July

Copper Fairly Easy

Copper supply is not causing too much concern at the moment. The tin situation is well in hand. Brass mills continue to operate four days a week in most departments. Deliveries can be made in two to three days to five to six weeks, depending upon the product involved.

▸ Copper wire and cable business has been so good that wire mills have been able to maintain a full-week work schedule.

▸ Aluminum continues to benefit from the tightness of steel. Substitutions have been made in many items.

Tool and Die Sales Turn Up

Tool and die business is looking up. More shops report a favorable outlook today than a month ago. In the East, tooling orders have been placed for new models of radios and refrigerators. Automotive demand also is expanding. The contract tool and die industry is convinced that it is on the verge of a pronounced upward swing, as against the downward trend which prevailed the first seven months of 1947.

Appliance Output Sets Records

Household appliance people continue to set new records. Standard-size household washers produced in September totaled 354,094 units, or 12.5% higher than the previous all-time peak in June.

▸ Sales of standard-size washers in the January-September period amounted to 2,669,778 units, a gain of 30% over the entire year 1946. Ironer sales in the same period were 411,074, compared with 124,616 in all of last year.

Refrigerators Doing Well

Manufacturers of electric refrigerators and electric ranges report no slackening in interest, despite output far surpassing prewar levels. Only limiting factor still is availability of steel.

▸ Hot water heaters also command a seller's market and promise to be in that category for some time. Capacity in dish-washing equipment is inadequate to fill current requirements. New manufacturing facilities are being rushed to completion.

Electric Motor Demand Still High

The terrific demand for electric motors continues, but indications are that an easing of the situation is not far off. In general, the bigger a motor, the harder it is to get. However, some improvement is reported in large motors of over 20-hp., though deliveries are 10 months off.

Higher Minimum Wage Standards Are Anticipated

WASHINGTON — A change in the wage-hour law is in prospect for next year. The object of the House labor subcommittee, headed by Rep. Samuel K. McConnell, is to overhaul the law (Fair Labor Standards Act) completely.

The Truman administration, as well as organized labor, wants Congress simply to raise the minimum from 40 cents to 75 cents an hour. In addition, Maj.-Gen. Philip B. Fleming, Federal Works Agency administrator and former head of the wage-hour office, would establish industry committees for setting higher minimums "in industries that could stand them" and lower levels where necessary.

Chances are that Congress will provide for a higher minimum wage, near 60 or 65 cents, but it will also make other changes in the law which might invite presidential veto and result in no new legislation on the subject.

The double-barreled amendments to the wage-hour law will probably increase the number of workers who are exempt from its coverage, such as workers in the higher brackets.

The exemption of administrative, executive and professional employees may also be liberalized and some of the discretionary authority for defining such workers taken from the wage-hour administrator.

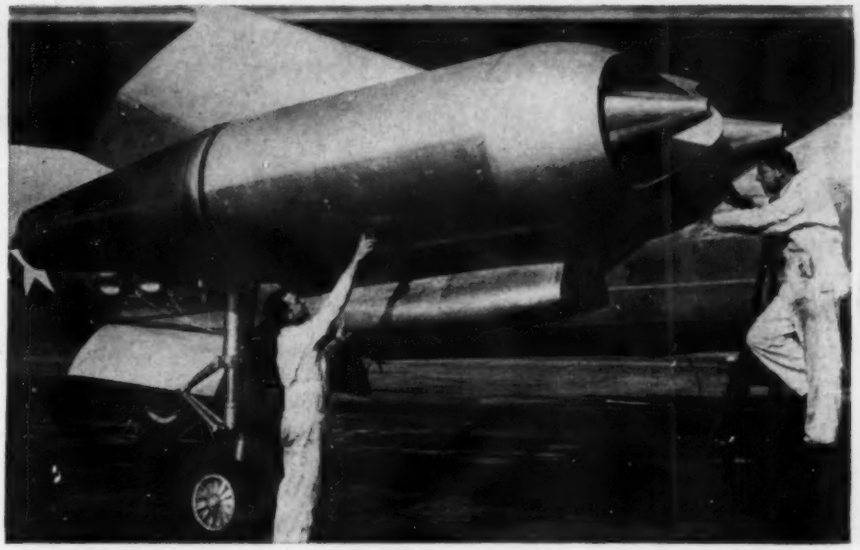
Management witness before the McConnell subcommittee have pressed for a tightening up of the definitions of exempt employees, as well as for abandonment of the penalty time-and-a-half for overtime beyond the 40-hour week.

To simplify understanding of what salaried employees are exempt from the law, James J. West, Buckeye Steel Castings Co., Columbus, Ohio, testified before the subcommittee that, with respect to salaried workers, Congress should fix a minimum amount of salary which should be the sole criterion as to whether overtime compensation should be paid.

Ford Okays Smoking

DETROIT — Henry Ford, 2nd, who smokes cigarettes, has scrapped his grandfather's 34-year-old rule banning smoking. Not even vice presidents were granted this pleasure during working hours in the past.

Under the new order, however, women will be prohibited from smoking. Mr. Ford warned workers of abuses, threatening to take away this new liberty if rules are broken.



First Closeups of the New Boeing XB-47 Bomber permitted by the U. S. Air Force shows two of the plane's six jet engines. Four of the General Electric engines are mounted in pairs under the inboard section of the wings and two are near the swept-back wing tips

Cancellation of Orders, Shortages Felt as Foundries Reduce Backlogs

CLEVELAND — Cancellation of South American orders for textile machines made itself felt in some sections of the gray iron foundry industry according to Cleveland trade reports. These cancellations have, as a whole, permitted the industry to continue to reduce its sizeable backlog. August, 1947 figures, quoted by the Gray Iron Founders' Society, show a backlog totaling 2,631,000 net tons as compared to 2,814,000 tons for the corresponding month of 1946. August, 1947, shipments totaled 951,800 tons as compared to 973,200 tons for the corresponding month of 1946.

Cancellation of the South American textile machine orders did one other thing—it caused some foundrymen who had been paying up to $80 per ton for Belgium pig iron, Boston, to start looking elsewhere for this commodity. But the scramble for pig continues with one midwest foundryman so desperate for foundry pig as to offer $120 per ton for immediate delivery.

Soft Spot Developing

Some few isolated soft spots continue to develop within the industry. On the whole production continues at a high level, but limited more or less by the amount of foundry coke, scrap and pig iron that can be obtained.

Gray iron foundrymen were cheered generally by the well-founded rumor that 2 million tons of government scrap will be made available to the iron and steel industry by July 1, 1948, and, were further cheered to learn that the "over-the-quota" merchant pig iron, amounting to between 15% and 20% of the total, will be distributed more generally after the first of the year instead of being channelled entirely through the office of the housing expeditor for exclusive use of house items.

New Furnace Due in Jan.

A more plentiful supply of merchant pig looms on the horizon for the Southern foundrymen in the announcement the Dangerfield furnace will go into full blast about Jan. 1, as will a present cold furnace in Alabama, and another Alabama furnace will start allocating a part of its production to merchant pig soon after the first of the year.

Foundry grade coke is expected to be a problem for the industry for the next several months, at least. Coke makers complain at the grade of coal they are able to obtain, claiming that many of the former high grade mines have been worked out coupled with an increasing tonnage of the better coking coals now being exported, leaving them with the rag-tag. A bright spot is the construction of coke ovens by some of the larger steel companies.

Malleable iron foundries are at a high production level with orders keeping pace with production. However this industry, like its brother, the gray iron foundries, is having a difficult time in securing the amount and grade of pig iron and coke needed, and, like the entire iron and steel industry, are worried by the present scarcity of good scrap and at the asking price by some of the larger brokers and dealers.

Foreign Propaganda Threat to U.S. Industrial Peace, ASTE is Warned

BOSTON—Warning that, while the actual shooting stage of World War III has not arrived, the propaganda and fifth column stages are now in full swing, Clayton R. Burt, chairman of the board, Niles-Bement-Pond Co., urged members of the American Society of Tool Engineers to be on their guard against foreign-inspired propaganda designed to promote industrial discord.

Speaking at the 15th semi-annual banquet of ASTE in Boston, Nov. 1, Mr. Burt pointed out that a glimpse into the past would indicate some useful trends for future thinking. The work already performed by tool engineers, he said, is deserving of all credit, but the task ahead is no proposition to be shrugged off, and will tax the ingenuity of every designer.

To show what had been accomplished in the past 47 years, the speaker mentioned that in 1900 a No. 2 Universal Milling Machine sold for $650 including countershafts. The same machine today costs $5400 including motor drive. This is not merely a case of price increase, however, since today's machines are vastly superior to their predecessors in speed, power, output, life expectancy, and ease of operation and maintenance.

Heritage Still Bearing Fruit

Much credit is due, Mr. Burt said, to the pioneers who designed early tools and machines which provided the very foundation for the present high standard of living. The automobile itself, as well as the tools to build it, are essentially a product of New England, and New Englanders can be proud of their heritage of precision manufacture, a heritage that is still bearing fruit in a very creditable way.

Until the beginning of World War I, progress in machine tools and tooling had not been very startling, and munitions manufacturers, lacking the necessary know-how, encountered innumerable difficulties in fulfilling their contracts to government specifications. Between the wars, however, vast strides were made, and manufacturers in the recent war had the advantage of heavier, motor-driven machines, with higher feeds and speeds, which, with the latest developments in cutting tools were able to turn out four to eight times more production per unit than before. Moreover, management and workers were able to capitalize on the know-how gained in the first war.

Output Must be Pushed

There was never a time in the history of the world when there was more confusion, misunderstanding, bitterness and hatred than exists throughout the world today, and it is time, Mr. Burt said, to pause and think carefully if we are to continue to have liberty in this country. It has been stated, Burt continued, that the machine tool industry is the only one that can pay off the national debt, and there is no way to raise the standard of living except by increasing man's output on production by better skill, better methods and better tools.

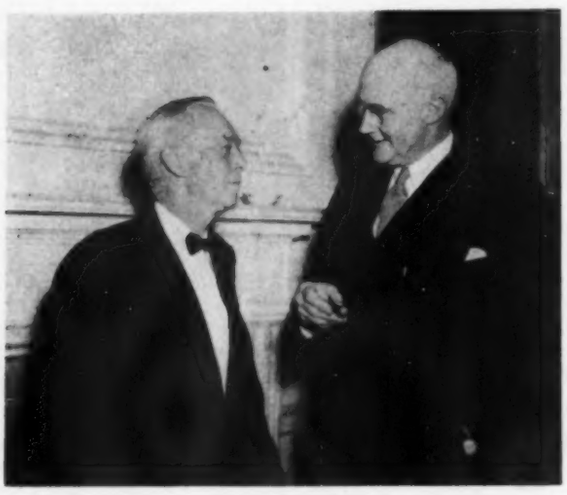
The crippling disease of strikes, slowdowns and senseless bickering must stop. In many cases management has failed to recognize and encourage the individual worker, and has regarded him as a cog in the wheel. On the other hand, too many workers have failed to turn in an honest day's work, yet expect top wages for only indifferent skill and loyalty.

Clayton R. Burt, chairman of the board of Niles-Bement-Pond Co., is shown speaking at the banquet of the American Society of Tool Engineers in Boston

Bright Future for Engineers

There is a bright future ahead for tool engineers who are entrusted with the task of designing tools to reduce manufacturing costs and increase production, but it is essential that they keep posted on all improvements in machines and methods. It is strongly urged, Mr. Burt concluded, that we should lose no time in making ourselves invincibly strong, for there will be no universal peace in the world until that country which most sincerely desires universal peace shall become the strongest of all in its armed might. Always the central point of attraction, the technical sessions attracted large audiences from the nearly 1000 members and guests attending the semi-annual convention. The first paper was presented by W. T. Montague, vice president, and manager, business planning and developing; A. A. Klein, assistant director of research; and G. T. Rideout, sales manager, Norton Co., Worcester, and dealt with "A New Concept in the Field of Abrasives—32 Alundum."

"The Importance of Welding to the Tool Engineer" formed the subject of a paper presented Thursday evening. J. E. Anderson, assistant to works manager, General Electric Co., Lynn River Works, Lynn, Mass., acted as keynote speaker. He emphasized that welding should not be considered as a specialized process, but as a fundamental method of fabrication that should be used and exploited with good judgment to



Herbert H. Pease, president of NMTBA and president of New Britain Gridley Machine Division, talks things over with **F. U. Conard,** president of Pratt & Whitney Division of Niles-Bement-Pond Co., at the ASTE meeting

take its proper place with other methods of constructing and repairing tools and fixtures to the economic advantage of the user.

Outlines Various Methods

D. W. Puffer, welding section, G.E. Lynn River Works, then outlined the various welding methods and techniques, showing how each operated, its effect upon the structure of the base metal, and where it should or should not be applied. He was followed by E. H. Girardot, foreman, tool design section, General Electric Co., Schenectady, who described and illustrated numerous applications of welding to jig and tool construction and repair. He emphasized that welding is not a cure-all, and showed that good judgment must be used in selecting the applications in which welding would be of greatest benefit.

The session on Friday afternoon was devoted to "Material Handling," and featured a keynote address by Edward J. Burnell, vice president, Link-Belt Co., Chicago, on the economics of good material handling equipment. C. A. Litzler, president, Industrial Ovens, Inc., Cleveland, discussing the handling of webs and nonofilaments, and P. R. Minich, district manager, Rack Engineering Co., Philadelphia, dealt with "Material Handling in the Efficiently Organized Plant." "Visual Planning for Production" was presented by Homer H. Dasey, president, Visual Production Planning, Inc., Pittsburgh, and Thomas N. Parlon, associate director of field activities, Yale & Towne Mfg. Co., Philadelphia Div., delivered a paper on cost savings through efficient material handling.

E. W. Miller, vice president and general manager, Fellows Gear Shaper Co., Springfield, Vt., keynoted the Friday evening session on "Bearing Applications." On the program were Lewis Sandler, executive vice president, Johnson Bronze Co., Newcastle, Pa., who discussed the use of aluminum as a bearing material, and F. E. Ericson, executive vice president, Barden Corp., Danbury, Conn., who dealt with bearing selection with particular emphasis on antifriction bearings.

W. B. Peirce, president of ASTE; **Tell Berna**, general manager of NMTBA; **H. L. Tigges**, director of NMTBA and executive vice president of Baker Bros., Inc., and **E. P. Bullard**, chairman of the board of the Bullard Co., were among the guests at the ASTE session

Engineering Dean Speaks

"Professional Development of the Tool Engineer" formed the theme of the Saturday morning meeting, with William T. Alexander, dean of engineering, Northwestern University, Boston, keynoting the session with an address "Is Tool Engineering a Profession?" William D. Merrifield, assistant director in charge of technical training, Chrysler Corp., Industrial Training School, Detroit, delivered a paper pointing out that "Industry Needs More and Better Tool Engineers," and Dr. Mark Ellingson, president, Rochester Institute of Technology, Rochester, N. Y., discussed "The Professional Challenge of Tool Engineering."

The final technical session, held on Saturday afternoon, dealt with tooling for watches and clocks and was opened with a keynote address by Walter E. Mutz, treasurer, Chelsea Clock Co., Chelsea, Mass. Harry B. Whitehead, general superintendent, Telechron Inc., Ashland, Mass., covered the subject of "Tooling for Electric Clocks."

"Tooling for a Fine Watch" was dealt with by E. W. Drescher, superintendent of production, Hamilton Watch Co., Lancaster, Pa. The opposite side of the picture, Mass Production of Watches and Clocks," was presented by Roger M. Tarpy, managing director, Vulcan New England Co., West Hartford.

JANMAT Tagging of Machine Tools Drying Up Surplus

Transfers of machine tools from War Assets Administration under the JANMAT program to the armed forces increased from zero in March on a steep rise to $45 million per month as of September 1.

Of the total 92,000 items scheduled for JANMAT acquisition, 12,000 machines had been tagged and shipped to military warehouses on Sept. 30. Other thousands have been tagged but not yet tabulated.

The JANMAT schedule, which under law may be increased beyond the 92,000 mark, is the main channel of disposal that has all but liquidated the machine tool surplus that was hanging over the industry.

JANMAT will be a major activity of WAA during the winter months, under terms of an agreement between WAA, Army and Navy, pursuant to Law No. 364 enacted by the 80th Congress.

WAA and service officials expect that JANMAT instructions for shipment of acquisitions to service warehouses will be completed between 15th and 30th of March.

The 92,000 piece total includes many units not in the industry's definition of machine tools: such as punch presses, squaring shears, portable welders.

One motive behind the JANMAT program is the curtailment of export which might eventually contribute to a foreign war effort.

Officials told AMERICAN MACHINIST the uneasy world situation is partly responsible for the abrupt rise in assignment of machines to the reserve.

Probably the second section of the 80th Congress will be asked to authorize stockpiling of various machinery that would not be wanted in more peaceful circumstances.

Styling of Body on Car of Future Features Convention of Engineers

DETROIT—Papers presented and exhibits shown at the 2nd Annual Technical Convention of the American Society of Body Engineers at the Rackham Memorial Building of the Engineering Society of Detroit Nov. 5 to 7 gives a preview of what the future automobile will probably be.

Due to lack of space, many exhibitors had to be turned down, I. Louis Carron, Society President, says. The exhibits give a good cross section of what the parts makers have to offer the automotive trade for next year's cars.

Styling, production engineering, small-car problems, seating comfort, truck bodies, busses and coaches, body construction materials and passenger body engineering were the primary subjects considered during the convention.

Pontoon-Sided Bodies Discussed

"Pontoon-sided" bodies, now in at least six new cars, announced or previewed for 1948 are exemplified by Kaiser Frazer, Studebaker, Packard and Hudson. These bodies were discussed at length by several speakers and the general concensus of opinion was that they were going to be the style for several years but presented many difficulties in construction, operation and service. Loss of individuality was a prime criticism and damage by neighboring car doors in the parking lot was emphasized. Three-dimensional heavy chrome molding on the sides of the bodies was suggested as a preventative.

Curved windshields either in one or two pieces require special windshield wipers so elaborate in design that the rubber instead of the mounted blade is made replaceable. The side sweep of the new shields make it necessary to cut door opening beneath the rear edges of the shield so passengers can get in and out.

Hoods will be shorter and wider, drivers lower so that new hoods will probably have valleys between the center section and the fender section to brake up their flatness in appearance and give the driver some road vision near the car.

Improves Passenger Comfort

Passengers will sit between the wheels so both front and rear seats can be the full width of the car. This improve passenger comfort. In a few years these cars will permit either front or rear engine mounting without requiring a change in appearance.

Comfort is now being built into the bodies in numerous ways. U.S. Rubber has aircushions which can be inflated to the pressure most comfortable to the passenger, one oz. for backs, six oz. for driver's seat and three or four for the other passengers.

L. A. Young Spring & Wire Co. has seat cushions designed to take auxiliary springs so the cushion beneath the driver can be made stiffer, if he is a heavy person, than the rest of the cushion where the passenger rides. The cushion is designed so when removed from the car the new springs can be put in quickly and removed as easily if a change is required.

U.S. Rubber also have a new kind of floor mat supplied in colors with a surface texture that looks like the nap on a carpet. Studebaker and Cadillac, it was said, have adopted it for 1948.

Changes Due on Interior

Interior trim is in for a revolution. Plastic panels for the doors, new methods of fastening trimming for seats and head linings without tacks, new methods of fastening chrome boldings to the bodies, Prestole sealing strips that go between joints that are spot welded together, Masonite in leather or wood grain embossed finish that is protected by colored lacquer, beautiful cloth and woven seat-cover material is now being placed between two thin transparent thermoplastic sheets and then formed to trim sections of the body. All kinds of quick fasteners have been developed for windows, and other body fixtures, lights and other equipment. Tinnerman has a new method of fastening gasoline tanks in a car which saves 24 cents per car in material and time. They claim that one of the companies will reduce their 1948 attaching bill nearly five milion dollars by the replacement of their present bolt and nut methods. Most of this is in cutting out high-priced labor.

Labor saving methods of making body drafts by photographic processes, developed for aircraft production, is receiving much attention by the body builders. It not only saves man hours but greatly accelerates the new program development.

"Small Car" Much Discussed

The "small car" was an ever present theme among the body engineers. Appel contended that "people may not prefer smaller cars"—but "The economic stresses of increased taxation and decreasing pocket book may force a change in car design in this direction." Appearance is the first factor which confronts the prospect. A car must not be so small that it makes people feel ridiculous. "You don't get into it, you put it on," as one person said of the small car. Lack of success in selling small cars in the past has made organizations cautious. The economic trend may force the small car. "It is not goods which are getting more expensive but money which is getting cheaper" that will determine whether we get the small car when steel can be obtained.

New and Larger Is This Fiat 1100 motorcar which the Italian concern is ready to export. Previous export was limited to the 500 series

Useful Atomic Energy is Seen

NEW YORK—Reactors now under construction at Oak Ridge, Chicago, and Schenectady will produce useful atomic energy in a year or so, Dr. E. U. Condon, director, National Bureau of Standards, predicted here. He spoke at the Executives Night dinner of the New York chapter of ASTE.

The most important engineering problem, Dr. Condon said, is the development of materials with high strength for high-temperature use which do not absorb nuclear energy.

Technical Advance Will Continue, NMTA's 48th Annual Session Told

CHICAGO—Leadership and teamwork "such as even America has never seen" was called for by Frederick V. Geier, president of the Cincinnati Milling Machine Co., at the 48th annual convention of the National Metal Trades Association.

Stressing the deteriorating effects of unlimited government spending and regulation of economic and social conditions from 1932 on, Mr. Geier refuted contentions of some economists that our economy was mature and that the dynamic building of America was finished.

"In the field of invention and technical advance America is certainly not finished," he said. "Rather, there is every indication that the pace of progress is accelerating and that we are on the threshold of a future that should overshadow the past. To realize these possibilities, the American pepole need to demonstrate their finest qualities—their self-reliance and enterprise, their team spirit and united effort, their will to work and to mark up new performance records."

Citing the obstacles facing the nation in the path toward economic health, Mr. Geier said the resourcefulness and determination of industrial management can overcome them in considerable measure.

Vital Movement Stalled

Productivity of American industry and labor has been the potent factor in raising our standard of living, Mr. Geier asserted, and claimed that this vital movement has been stalled. "Yet, today you and I must exert every resource and every effort to rebuild the productivity of employees, to get unit costs down to levels where people can buy."

During the three-day session of the association, Nov. 5-7, a dinner was held honoring the 25-year membership of 283 concerns in the organization.

The general theme of the convention was "Sound Industrial Relations for the Job Ahead."

Mercer Lee, vice president of International Harvester Co., traced his firm's production program which was developed to "improve operating efficiency and to improve the employee's opportunity to enjoy employee security. It will make jobs more steady and make more steady jobs. It goes a long way toward providing employment stabilization, a condition highly desired by both management and labor," he claimed.

Definite Responsibility to Group

Long range production forecasting, production in control of inventory management, properly planned and executed, Mr. Lee continued, "is beneficial to each of the three groups which the International Harvester Co. believes it has a definite responsibility . . . the customer, stockholder and employee."

A strong warning to management was made by Lee A. Freeman of Chicago in discussing "Fringe Issues and Their Costs." Citing union demands which seek to prevent the introduction of labor saving devices, or to restrict management in the rearrangement of production lines, Mr. Freeman said. "At first blush these may not be considered fringe issues, but when once granted are usually followed by demands for costly severance pay in behalf of technologically displaced employees."

Cost Sometimes Tremendous

The cost of some of these issues are tremendous to a company, Mr. Freeman pointed out, and warned that "no contract restrictions on legitimate managerial freedom should be tolerated, since what may appear to be harmless when granted will very often rise to major importance as flexibility of operations becomes essential to survival in competitive society."

"Free Enterprise Is Dying of Ignorance—and it's OUR fault," Dr. Millard C. Faught, executive vice president of Young & Faught, Inc., New York, told the convention.

Free enterprise is rapidly losing ground, Dr. Faught said, but it is not a failure of the mechanics of the system but the failure of good industrial relations. Simple explanations of the mechanics of free enterprise rather than vague, meaningless explanations in regards to the intricate operations of a concern must be supplied the workers and the public, he said.

Must Be Sold

Failure to explain contract renegotiation, tax rebates, and labor relations has produced misconceptions in the mind of the average person. Free enterprise must be sold the same way you sell any other product, Dr. Faught asserted. "Give your works, your stockholders, your customers, your public all the facts. They'll come to the right conclusion."

Robert Newcomb of Newcomb & Sammons, Chicago, discussed "Meeting the Labor Press on Its Own Ground." He denounced concerns for hiring men to handle company organs who are unqualified to handle the job.

Discussion leaders included M. A. Hollengreen, vice president and general manager of the Landis Tool Co., Waynesboro, Pa.

Homer D. Sayre, commissioner of the Association, took part in the program.

MDNA Hears William Butler

NEW YORK—William Butler, member of the Economics Staff of the McGraw-Hill Publishing Co., was the dinner speaker at an all-day regional meeting of the Machinery Dealers National Association at the Hotel Pennsylvania Oct. 28. George B. McClennen, president Delta Equipment Co., Philadelphia, and national president of the association, and R. K. Vinson, executive director of the national association, participated in the sessions.

Dr. Brian O'Brien (left) and Gordon Milne, University of Rochester, demonstrates a new motion picture camera which takes 11 million pictures a second. The exposure is accomplished by doing away with shutters and using a system of lenses which dissect images coming through the opening and recording fine strips of light which are later projected onto a final film

William R. White, Jr., Midwestern Tool Co., Chicago, was elected president of the National Tool & Die Manufacturers Association at the second annual membership meeting in Philadelphia. **J. J. Kohl**, International Tool Co., Dayton, Ohio, was named 1st vice president and **John H. Benetz**, Bridge Tool and Die Works, Philadelphia, 2nd vice president

Good Business Predicted at NTDMA Session

PHILADELPHIA — Good tool and die business for the next three years as metalworking concerns tool up for new postwar models.

A better understanding by tool and die shops of what customers expect from the tools and dies they buy.

Warning that the United States be careful of its timing in any foreign lending program. "Dollars can create a lot of trouble and future distress for us if not used with infinite skill."

Election of William R. White, Jr., Midwestern Tool Co., Chicago, as president.

These are some of the news highlights of the second national membership meeting of the National Tool & Die Manufacturers Association held at the Benjamin Franklin Hotel Nov. 2-5.

Six Points Stressed

Six points for tool and die shops to remember were outlined by Ralph Allen, assistant superintendent, tool and plant maintenance division, Western Electric Co., Kearny, N. J.

1. Tools should be properly packaged for shipping so as not to be damaged in transit to users.

2. Close watch should be kept to see that specified tolerances are observed in the manufacturing process.

3. Other tool steels should not be substituted for those asked for without getting consent of customer.

4. Shops would save money if they made more process inspection of tools as they move through the shop.

5. If a shop does not possess die tryout facilities, it should arrange if possible for tryout to be done in a nearby shop.

6. Work should not be accepted by a shop before it has the actual production facilities.

Mr. Allen's points were made in a panel discussion on "Getting Best Results in Tooling" presided over by Burnham Finney, editor AMERICAN MACHINIST.

Five Steps in Tool Building

Another panel participant, Samuel H. Paul, supervisor of tool purchases, Heintz Mfg. Co., Philadelphia, emphasized that building a tool correctly involves a series of five steps: an engineering plan, design plan, actual building stage, tryout stage and formal acceptance. He said that the contract between customer and the tool shop should be clearly understood by both parties.

Centre W. Holmberg, president August W. Holmberg & Co., Inc., New York, and R. E. Ehrhardt, president Norwood Engineering Co., Dayton, Ohio, represented the shop owners on the panel.

The latter expressed the belief that the contract shop has the edge over the customer who seeks to make his own tools and dies because in the contract shop one man usually supervises all the steps necessary in building a tool or die.

Continuation of U. S. lending policies to date can only serve to bolster present socialist regimes and postpone sound reconstruction in Europe, said Marshall M. Smith, president E. W. Bliss Co., Detroit, in a paper read in his absence because of illness by Ray H. Sullivan, Bliss vice president.

Mr. Smith's observations were based on a two-months' tour of European and British industries. He predicted possible failure for Britain's export drive because higher cost of living in England, encouraged by black market operations and scarcity of goods for home consumption, probably will culminate in strikes and increased wages with sharp advances in the cost.

Training Program Urged

If the tool and die industry is to be assured an adequate skilled work force, it should do two things, said William F. Patterson, director, U. S. apprentice training service, Washington, D. C.:

1. Every employer of tool and die makers should train apprentices if he has job openings for them and if the local skilled labor situation warrants bringing more tool and die makers into industry.

2. Studies should be made in every community, preferably by joint management-labor apprenticeship committees, of the projected volume of production, the number of tool and die makers needed, and the number available.

"Realistic Methods of Estimating" was the subject of a talk by Richard F. Moore, president Moore Special Tool Co., Inc., Bridgeport, Conn.

New officers, in addition to Mr. White as president, are: J. J. Kohl, International Tool Co., Dayton, Ohio, first vice president; John H. Benetz, Bridge Tool & Die Works, Philadelphia, second vice president; Centre W. Holmberg, secretary; and Jerome Stanek, Stanek Tool & Mfg. Co., Milwaukee, treasurer.

Willis G. Ehrhardt, managing partner, Ehrhardt Tool & Machine Co., St. Louis, retiring national president, presided at the first luncheon meeting and the first general session.

Electric Motor Backlogs Reduced; Normal Market Predicted in 1948

NEW YORK—Unfilled orders for electric motors were cut one-third in the three months ending June 30. Some time next year, the industry's $75-million expansion program, now partially completed, is expected to bring about a normal supply situation.

Uncertain factor in the outlook is steel. Motor manufacturers find copper easy, steel tight, and are apprehensive of reported plans to export 3% of steel output.

Right now the order backlog is probably about 12 months production, but on June 30 it was 15.2 months and on March 31 it was 22.2 months.

Even though the electrical-motor industry reaches a normal supply situation, output will be on a higher plane than prewar. Increased demand comes from all sources. The average family used to have appliances that incorporated five motors, now the same family has or expects to buy equipment requiring 20 motors.

Similarly, the electrical content of industrial machinery is rising sharply. A few years ago, a machine tool might have had one motor. Today, similar machines have 5, 10, 15 and even 20 motors. One machine at the Machine Tool Show had 42 motors. Trend will be toward motorization of individual machine functions, requiring smaller motors in greater numbers.

Motors are tight for two major classes of end use: consumer goods and small equipment using fractional-hp motors, and machinery and industrial drives requiring polyphase ac motors. Unfilled orders by categories, as of June 30, were:

Kind	Number	Value
Frac.-hp motors	21,249,024	$286,011,863
AC polyphase	1,378,904	154,354,514
AC single-phase	508,158	38,609,844
DC motors	53,701	15,707,543
Mot.-gen. sets	12,550	7,467,250
Total	23,202,357	$502,151,014

After the electrical motor industry whittles down its $500-million backlog, the $75-million expansion program will aid customers in a number of directions. Standardization is counted on heavily. Announced at close of the annual meeting of the National Electrical Manufacturers Association was completion of a 10-year effort to provide performance standards for polyphase motors.

These polyphase motors are the general-purpose squirrel-cage motors so widely used in industry. New performance standards for these integral-horsepower motors (1 to 200 hp.) have these objectives:

1. After Jan. 1, any buyer of a Design A, B, C, D or F polyphase motor will be assured that it is interchangeable in performance characteristics (as well as dimensions) with a similarly designated motor built by another of the 58 motor manufacturers. (There will be no compulsion upon any manufacturer to build such motors or to start building them by a specific date.)
2. Assurance that performance-standardized motors will be acceptable to power companies.
3. Clear definitions of performance characteristics of the five designs will aid the purchaser to apply them suitably to various kinds of industrial drives.

Super-Economical Autos Feature European Shows

(McGRAW-HILL WORLD NEWS)

Two European automobile shows recently revealed the aim of many nationalized enterprises to concentrate on fewer models than before the war to lower costs of production and enable them to compete with foreign products.

At the 28th International Automobile Show in Prague, Czechoslovakia, the Tatra 107, a four-cylinder, aircooled, engine-in-the-rear car attracted the widest interest. The Czech-built vehicle has a flat-twin motor of 16 hp. and production is expected to start early in 1948. The all-metal four-door body is self-supporting and is welded in one piece with the central frame. The appearance of this model has already won prizes in Paris and Holland.

Due to transportation difficulties Italy and France have representative stands, but there was very little showing from England and the United States. Studebaker gave the best display of U.S. workmanship with three models.

At the 34th Paris Automobile Show only moderate crowds were attracted and fewer novelties were provided for the public. Among the 900 exhibitors were included most of the important American makers, but they showed largely the same cars seen at last year's show. Except for Ford, which displayed the products of its French and British factories, their presence was largely a matter of prestige.

Aside from the large deluxe vehicles made by such firms as Delahaye, Delage, Bugatti and Alfa-Romeo, and equipped with superb custom bodies, chief public interest went to the new super-economical models presented by Renault, Panhard and Tatra.

The 19-hp. Renault rear-engine car, already shown in prototype at last year's Paris show, has now reached a production rate of 10 a day and the company has nearly completed tooling up which will permit output of 300 daily. The four-cylinder motor travels 40 miles on a gallon of gasoline. Final price will be set between $1400 and $1500.

The Panhard Dyna, weighing 1200 pounds, has a forward engine powered by two opposed cylinders and completely air-cooled. It is rated at 24 hp. The aluminum body is better fitted than the Renault and rests, as does the engine, on rubber cushions.

Simca also displayed its new Simcasix with a 16-hp. motor placed forward of the front axle.

Engine in the Rear features this four-cylinder, air-cooled Czechoslovakian auto, the Tatra 107. This flat-twin car is built with the view of giving the lowest possible weight and production is planned early in 1948

Chicago Plants' Productivity High As Labor Unrest Hits Postwar Low

CHICAGO—Labor unrest in Chicago area factories has just about hit a postwar low, according to personnel executives and plant managers. Although International Harvester is having some difficulty in its negotiations with the CIO Farm Equipment workers over certain rates in 11 Harvester plants, other companies say that labor troubles are almost non-existent.

Other cheerful notes in the Chicago area plants are that productivity is up sharply and is continuing to rise; the number of minor labor grievances is declining; and those grievances that arise are settled smoothly by established procedures.

At the same time there is universal belief that a third round of major wage increases is inevitable. When a number of contracts are up for renewal around the first of the year, it is expected, a new pattern of wage hikes will emerge. It is also expected that certain contracts with reopening clauses will be discussed in the next few weeks.

Some of the credit for the unprecendented quiet on the labor front in Chicago is given to the Taft-Hartley act. Other executives attribute the lack of unrest to labor politics, asserted that national union leaders are jockeying for position before attempting any new moves.

At the local union level, in Chicago, plant newspapers keep reiterating the claimed disparity between wage increases and price increases in recent years, but there has been little inflammatory comment.

Certain categories of skilled and semi-skilled labor remain very scarce. One plant here recently established a punch press department which needs a force of 24 workers. After a five-week recruiting campaign, the department is still short ten employees.

Some metalworking plants are attempting to lure workers from the service industries in outlying cities around Chicago, such as Joliet and Kankakee. Since the firms have no housing in Chicago to offer, they are sending daily buses to these communities to get the workers, hauling as many as 300 a day.

Francis Trecker Named President

MILWAUKEE—Francis J. Trecker has been elected president of the Kearney & Trecker Corp., filling the vacancy left by the death of Joseph L. Trecker. Edgar W. Trecker has been named executive vice president.

Francis Trecker heretofore was secretary of the Kearney & Trecker Corp. During the early days of the war he was associated with his brother Joseph in promoting the subcontracting of war production on behalf of the War Department. The two brothers then were special assistants to the Secretary of War with headquarters in Washington.

Edgar Trecker has been vice president in charge of manufacturing.

British Tool Men Will Attend Show

LONDON—A delegation from the Gauge and Tool Makers' Association will arrive in the United States March 10 to visit eight cities and attend the convention of the American Society of Tool Engineers in Cleveland March 15-19.

The itinerary follows:

New York, March 10-11, Hotel Commodore; March 12, Hartford, Conn.; March 13-14, New York; Cleveland, March 15-16-17, Hotel Statler; Cincinnati, March 18-19, Hotel Gibson; Chicago, March 20-22, Hotel Bismarck; Detroit, March 23, Book-Cadillac Hotel; March 24 leave for New York.

"Packaged" Cars Fought

CHICAGO—Standard Railway Equipment Mfg. Co., the only firm that specializes in freight car roofs and ends, is taking aggressive steps to counteract the swing towards "packaged" freight cars.

The company will soon announce a development in railway maintenance equipment aimed at cutting freight car repair time, and it has also recently perfected a diagonal panel roof that resists car twisting and an adjustable deck that makes two floor levels possible in livestock cars.

Three Men Win Lincoln Award

BALTIMORE, MD. — First grand award of $13,200 of the James F. Lincoln Welding Foundation $200,000 Design-for-Progress Award Program has been awarded to three members of the Aeromatic Propeller Dept. Koppers Co., Inc.

Paul F. Hackethal, chief engineer; C. C. Mast, shop superintendent, and D. W. Hamilton, welding foreman, traced in their prize-winning paper the evolution of three hub designs from heavy, expensive forgings to the present tubular design, arc welded structure. The 200 hp. hub was reduced in weight from 17.8 pounds to 12.2 pounds.

Two-Time Winner

PITTSBURGH—For the second year in succession, Julius Heuschkel, welding specialist at the Westinghouse Research Laboratories, has won the $750 first prize in the annual contest of the Resistance Welder Manufacturer's Association, it was announced recently by the American Welding Society.

The winning essay was based on the metallurgical aspects of carbon steel spot welding.

Officers of the New Council of Profit Sharing Industries elected recently in Cleveland are: J. F. Lincoln, Lincoln Electric Co.; executive secretary, Dr. R. S. Hartman, Wooster, Ohio; secretary, John D. Gordon, Progressive Welder Co., and vice chairman, H. E. Nicholas, Orville, Ohio

Diesel Output Up 66%

CHICAGO — Electro-Motive Division, General Motors, is now turning out diesel electric locomotives at the rate of four main-line and one switching unit a day, an increase of 66% from output a year ago.

The company has about 65 orders for its new branch-line locomotive, which can be used for passenger or switcher service.

Plant Expansion High in Chicago

CHICAGO — Attention of Chicago area metalworking executives has been focused on plant expansion in the region as the result of reports that two Detroit auto parts makers are planning to announce sizeable new operations in Chicago. Neither firm has heretofore had a Chicago plant. Both companies have been busily surveying the labor market here in recent weeks.

Their surveys disclose an extremely tight labor supply, but the shortage is not critical. Employment is holding steady in metalworking plants, and there remains a small pool of unemployed workers who might be lured into jobs.

Equals 1946 Expansion

Industrial expansion in Chicago in 1947 has been roughly equal to the 1946 total of some $184 million, which set a peacetime record. And expansion seems to be on the upswing, since totals for the latest month were approximately double those of the comparable 1946 month.

A study by the Chicago Association of Commerce and Industry shows a phenomenal growth in industrial facilities in the Chicago area in recent years. The total expansion since mid-1940 has been about $1 billion, 700 million, the greatest cycle of expansion of any like period in Chicago's past, and, it is claimed, is a far greater investment than was made in any other industrial area.

Other Plans Revealed

Among the companies that have recently announced that new facilities would be built (in addition to expansion announced earlier by some of the same firms) are Electromotive, Clearing Machine, Goodman Manufacturing, Columbia Tool Steel, National Die Casting, National Steel Container, Krueger & Co., and the Chicago & North Western Railway, which will build a diesel locomotive maintenance shop.

It is also learned that several other companies are planning extensive expansion moves but are held up by shortages of materials.

Steel Men, Lewis Both Incorrect, BLS Says; Miners Gained 29 Cents

WASHINGTON — The Bureau of Labor Statistics seems to have settled the issue over how much of a wage increase John L. Lewis obtained for his United Mine Workers in the bituminous agreement of last July. It was more than 29 cents an hour.

Lewis, it will be recalled, claimed an increased "increment" of $3.54 a day, or 44 cents an hour for each miner.

U. S. Steel, which spearheaded the settlement, and President Truman's Economic Advisory Council scoffed at Lewis's claims. They said the miners got only the pattern 15-cents-an-hour boost. This was arrived at by dividing the daily take-home increase of $1.20 by eight hours. But they did not take into consideration the reduction in hours worked from nine to eight, the increase in welfare fund payments from 5 to 10 cents a ton and the extra 15 minutes paid lunch time.

Now BLS comes through with figures on the miners' earnings during June, July and August, which would seem to offer a fair basis for comparison.

Average hourly earnings rose 29 cents (from $1.48 to $1.77) between June and August. During the same period, average weekly earnings went up from $67.09 to $71.49, despite reduction of four and one-half hours in the average work week. These average earnings do not include the 10-cent royalty payments to the union's welfare fund on every ton of coal produced.

Horizontal Roll Used To Corrugate Aluminum

SAN FRANCISCO—Using machines which are said to be the only ones ever designed to roll aluminum horizontally in any length, Robbins Metals of Spokane, Wash, is producing a half carload of aluminum roofing, siding and door and window trim daily.

In line with the expansion program recently announced by E. W. Bliss Co. for its Salem, Ohio, plant, this massive Ingersoll table-type open-side mill is being installed. Dimensions are 10 by 10 by 30 feet. It has two spindles, 14 and 6 inches. It is shown boring and facing tie rod holes on a 144,000-lb. press bed

Backlogs in Gear Industry Rising, Pres. Tripp Informs Association

CHICAGO—Labor and government represent only two of the three legs of American business. The third is management. Two legs cannot have special lengths or special privileges without tilting the whole. It is time for the tilt to be corrected, Pres. R. B. Tripp, asserted in opening the 1947 semi-annual meeting of the American Gear Manufacturers Association at the Edgewater Beach Hotel Oct. 27. Registration was approximately 200, attendance at the banquet Oct. 28 over 300.

In reporting on the state of business in the gear indsutry, Mr. Tripp said backlogs had risen in the last 60 to 90 days, 15% in the last month alone (October). Chairman Flagg of the membership committee reported association membership is now 170.

New Standards Due

Newbold C. Goin, executive secretary, reported that several additional gear standards are now being printed and that the new statistical division has begun a long-range program. In later sessions, a tentative standard on gear nomenclature (112.01 parts 1 & 2) was adopted as was a standard for master gears (235.01). Association committees are preparing a fine-pitch worm-gear standard (0.30-0.16 axial pitch) requiring only simple mathematics in use, a worm-gear inspection standard, one on straight-sided splines, and a data sheet on lapping compounds for gears. Higher loadings for modern high-strength materials will be included in the revised standard for helical herringbone gears. A new committee on Automotive Gearing, was set up, with J. O. Almen as chairman and Forest McFarland of Packard as vice-chairman.

Recent increases in number and frequency of trade shows have led the AGMA to begin a study of them. The intent is to determine which shows are of value commensurate with their cost in terms of exhibits and time.

Statistical Reports Greater

D. T. MacCartney, AGMA statistician, reported a 58% increase (40 to 63) in member companies providing monthly reports on bookings, shipments, and other statistics. The AGMA Index (bookings) is being modified to make the base years 1935-39 rather than 1928, conform with FRB and BLS practice. It will present the figures of 21 companies (about 70% of the gear business) available for the 17-year period. Prorating of large orders is discontinued and adjustments made for price rises. The new method will become the sole one June, 1948.

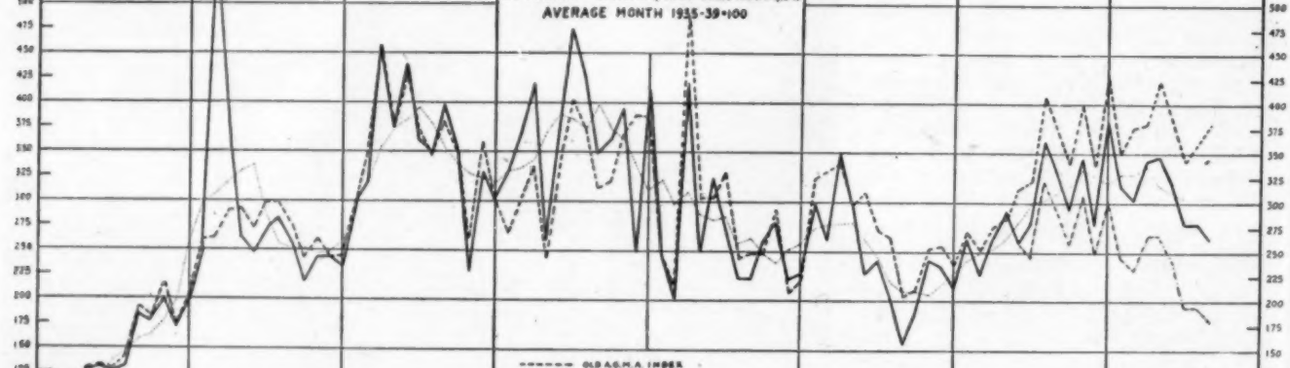
Other statistics reported by Mr. MacCartney were studies of productive to non-productive employees in 43 companies. These indicate much disagreement over whether toolroom, engineering, pattern shop and inspection employees should be classed as productive or non-productive, because ratios range from 11.3 productive to 1 non-productive, down to 0.8 to 1. In discussion, L. R. Botsai of Westinghouse said it was his company's practice to consider as productive labor *only* that adding value to the products, so toolroom, engineering and pattern-making are in the non-productive bracket.

Another variation was found in machine hour rates, some plants using the same rate for all operations except those on the largest machines—regardless of capital investment. This practice (as pointed out by vice president W. L. Schneider, chairman of the guiding committee) may result in underabsorbed overhead.

Two Papers Presented

Two technical papers were presented—F. E. Birtch, manager of the Cone-Drive Div., Michigan Tool Co., describing his division's product, and L. J. Collins, gear consultant of General Electric discussing gears —their applications, design and manufacture. Discussion of the latter brought out that in gearing (as in many other products), engineering and design are very costly elements. In precision gearing, design must be varied to take account of many factors. Web design, for example, must be different for induction hardening than for carburizing.

Simon Davidian, Armenian by birth, explained incorporation of the remnants of his people as a Soviet republic, outlined the Soviet doctrine of expansion, using border republics and satellite states as tools. G. Edward Pendray, rocket authority, was the guest speaker at the AGMA Dinner, Oct. 28. His major point was that management has been remiss in failing to educate labor in the true understanding of costs.



New and Old AGMA Indices Compared Bookings for 21 companies (about 70% of the business), based on 1935-39 as 100, form the new AGMA Index, here compared with the old. Peaks in the new index are big wartime orders formerly prorated over several months. The finely dotted line is a 6-mo. moving average, selected because average gear and gearing contracts require about 6-mo. from order to shipment. Wide variations in index trend occur in the present year, particularly if 43% price rises are allowed for, as shown in the lower curve. Both indices will be computed until June, 1948, after which the old one will be discontinued

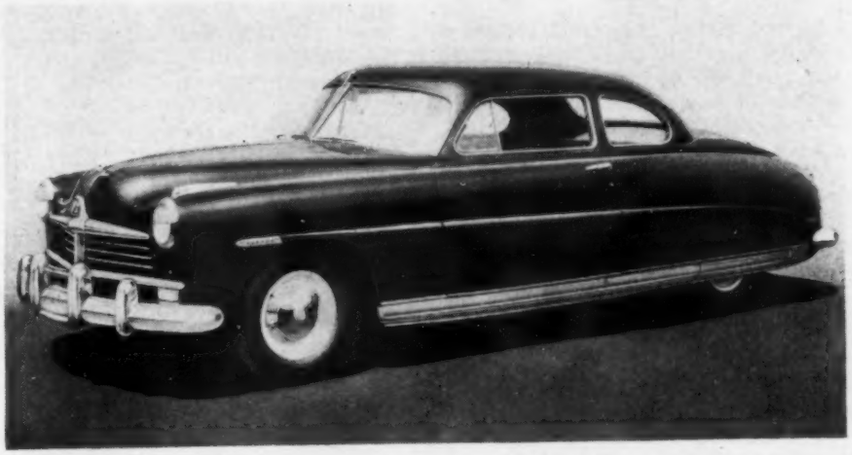
Detroit

FOURTH HIGHEST AUTOMOTIVE OUTPUT PREDICTED FOR 1947...HEAVY TRUCK DEMAND EASES...1948 BUICK TO ELIMINATE GEAR SHIFTING

Anticipations for production of cars and trucks have brightenend modestly during the past month, but are still unlikely to reach above 5 million units. The rate of manufacturing this year through October brought about 4,150,000 completions.

Sustained 100,000-a-week rates through the remaining 8½ production weeks of the year would surpass the round figure, but time off for Christmas holidays, together with the likelihood of short changeover and inventory shutdowns during the holiday period, will shade the average downward a bit—not to speak of day-to-day losses caused by short receipts of steel and other bottleneck materials.

All the same, a total within nudging distance of 5 million is highly respectable. Only 1929, 1937 and 1941 surpassed that mark.



First of the new-model Hudson, Commodore Eight, six-passenger coupe. The new car, according to Hudson, has the lowest center of gravity of any auto on the market. It is only five feet from the ground to the top. "You step down into, not up on it," Hudson reports

Increase Doubted in 1948

Next year will not be significantly in excess of this year, if informed opinion among auto men holds true. Sheet steel is not expected to loosen to any great extent through the first half of 1948. Pig iron may then crop up as a new bottleneck. Some companies will shut down for changeovers of prewar length during 1948, in order to bring out their real postwar models.

Then, too, the inevitability is always ahead that some day, but probably not in 1948, the incessant demand for cars which has existed since VJ-Day may lighten appreciably. There is no gainsaying the fact that the "emergency" demand segement of the auto market has been satisfied. The "intense want" portion is now being filled. Next comes the "desire" part of the market, and from there it is but a short step to the appearance of a buyer's market.

Heavy Truck Demand Eases

The market has reached the "desire" stage on heavy trucks and possibly has already gone by it. Heavy truck makers, at least most of them, are finding today they must get out and sell.

The parts production end of the busienss, too, has dwindled during 1947. The year came in with emergency needs satisfied, and thereafter retail stocks began to swell out to the point that order cancellations suddenly began to show up. Business picked up again in the summer, but it is quieting down again now.

Parts makers probably will not have as good a year in 1947, when all the figures are in, as they had in 1946. Last year saw shipments aggregating $1 billion, 753 million, up 73.2% from 1945, more than double 1941, and more than triple any other postwar year.

Looked at another way, parts shipments made by the entire accessory and parts industry had dollar value last year equal to about 54% of that of new car and truck shipments, both figures being on the wholesale price basis. In 1940, however, parts sales valued at only 18%, and this was a fairly normal proportion. As car junking rates return toward normal and older cars leave the road, parts demands will correspondingly slacken.

Thesis Not Justified

Some question has been raised whether this abnormal parts production may be the reason automotive company receipts of steel have not resulted in proportionate output of finished cars and trucks—whether steel has been diverted to parts rather than finished cars. Generally, this thesis is not justified. Steel company shipments for all automotive uses are somewhat lower, percentagewise, than they were prewar in both total steel and flat rolled categories.

But actually, the industry is receiving about as much as it did before the war, inasmuch as the proportion is based on a higher total tonnage of finished steel than heretofore. Obviously, if more of this tonnage had been used by the car and truck makers, higher output would have resulted. But cars on the road would have run into breakdowns because of lack of replacement parts.

The long-rumored Buick automatic transmission is definitely in the 1948 models, although new body work has been eliminated. The Buick no-shift clutchless device eliminates all gear shifting, even automatic. Tooling on the new transmission is well in hand, as is evident by the planned January introduction date of the new Buicks.

Pontiac will use a Hydra-matic transmission as optional equipment this next year.

Tooling Operations Mounting

Tooling operations continue to edge up in the independent shops, perhaps somewhat more than in the captive establishments. The average Detroit work-week is now crowding 46 hours. Rates, incidentally, stand today practically at $2 an hour in the Detroit area tool and die shops; some smaller establishments are definitely above this level in their effort to skim off available help from a rather short supply of craftsmen.

Tooling costs are complained of more and more by the car companies. They say that large scale changeovers every year, like in the past, have been impossible because of the expense of new manufacturing equipment. However, something can be said on this score from the standpoint of the toolmaking companies. They have little choice, like others, but to raise prices when their wage rates go up; and their costs are far more closely tied to rates than in production companies whose machinery on hand stands at a constant figure, holding down production costs below the ratio of wage increases.

New Expansion Plans for Steel Seen in Making

PITTSBURGH — The steel industry is expecting that additional expansion plans, to include a substantial volume of new ingot capacity, will be announced before the close of this year.

The extent of this expansion is unavailable at present, but it is believed that plans for additional steel-making furnaces are being processed to supplement a previous program of 2½ million tons of ingot capacity announced a few months ago.

This latter program failed to still agitation for a larger steel industry in the United States to cope with an extraordinary demand. Now with a definite program of aid to Western Europe shaping up, and which may last for a minimum of four years, coupled with a new Washington proposal for domestic allocation of steel, some steel executives resignedly are in process of approving construction of new furnaces.

In the previous 2½ million-ton expansion program, attainment of the objectives was to be in part through the use of oxygen in speeding the process of steel-making.

Against Political Allocation

The steel industry is unalterably opposed to political allocation of steel, which in the minds of officials, is a preliminary to price control. Any new allocation system, in their minds, will not increase the output of steel in any way.

The matter of steel prices becomes more pertinent as the year-end approaches inasmuch as costs of production have continued to mount. The steel industry is opposed to a price rise of any sort at this time, but it is freely acknowledged that any hold-the-line policy is of uncertain duration.

Steel men would like to hold prices for the first quarter, with the possible exception of tin plate, but uncertainty springs from scrap and some other commodities where the delivered costs to the mill have mounted. A factor in the latter, of course, has been higher freight rates.

Steel demand has an unparalleled persistence. A few grades are in only moderate demand but the urgency for material in all other directions is as pressing as it has been in any period of the postwar era.

One large producer has been informing consumers that it is unlikely it will be able to increase quotas of sheets and strip until the latter part of 1948. This, despite the fact that some new facilities will be operating in the interim.

The record of finished steel production in 1947 has been a distribution of the available semi-finished steel in consistent allocations to the various types of processing mills. However, there are a few signs that this scale will be tipped to some extent in favor of tin plate in 1948 which may account for the expectation of no increase in sheets and strip for a number of months.

All these plans of course, hinge on what the steel companies will be ordered to do in respect to foreign shipments under the Marshall Plan. The steel companies are willing to take orders in this respect from Washington, but their acceptance is contingent upon Washington taking responsibility for any lessened shipments of steel to domestic consumers. The steel makers, also, believe that the domestic economy will be disturbed less if finished steel is shipped abroad and the U. S. refrains from exporting scrap and semi-finished.

October production of steel represented peace-time records in many instances, but the gains were spread out rather thin over a long list of users.

"Riding Control"

NEW YORK — An adjustable shock-absorber mechanism for "hard or soft" riding is featured on the new Rolls-Royce and Bentley cars now on a tour of the U. S. A control on the steering wheel adjusts them to suit road conditions.

Another innovation is a pedal under the dashboard which with a single stroke lubricates more than 25 points normally serviced with a grease gun. Seven models are included in the display which will visit key cities during the next four months.

Steel and Grain Inflation Keys, Council Reports

WASHINGTON — Steel and grain are the keys controlling inflationary effects of the Marshall Plan, President Truman's Council of Economic Advisors indicate in a report on the economic impact of foreign aid which is a companion piece to Secy. Krug's review.

CEA Chairman Nourse and his colleagues minimize the over-all effect on prices—in language suitable for quotation on the floor of Congress.

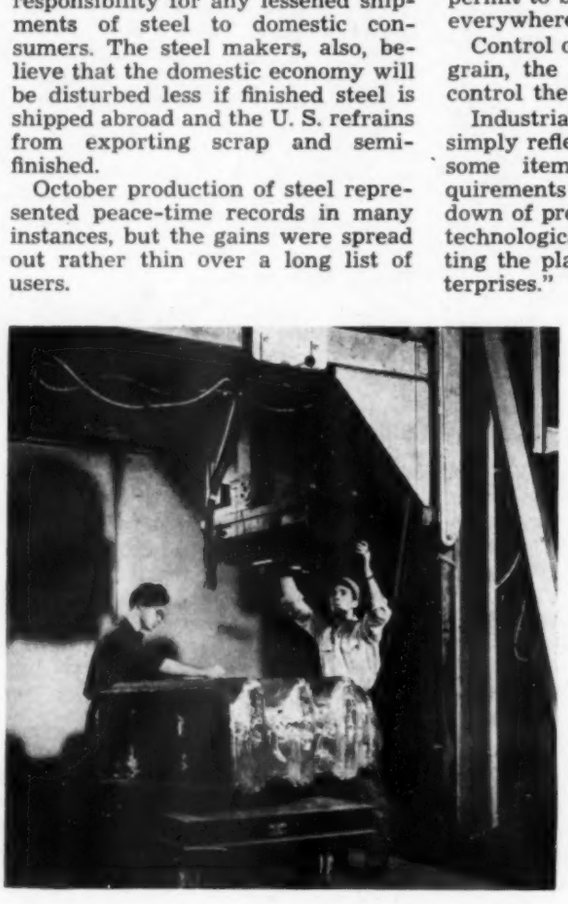
But steel and grain will be heavily affected—and through them, the council says, inflation can leak into the whole economic system.

Some 10.5% of steel mill output is now exported, more than twice the prewar rate. Though steel has a managed price, it's easy for steel makers to pass on wage demands and other cost increases. Moreover, steel shortages cause price-boosting shortages in the steel-using industries.

With 49% of the wheat going abroad—compared to a prewar 16% —in an economy already supercharged with money, it takes other foods up with it. Result: wage demands "which no rule of justice will permit to be ignored" push prices up everywhere.

Control on the impact on steel and grain, the council implies, and you control the impact of the Plan.

Industrial equipment troubles simply reflect steel shortages—but in some items "meeting export requirements will mean a slowing down of production, or of the rate of technological improvement, upsetting the plans of many business enterprises."



Radiographers mark up a Thermalloy muffle section for X-ray examination at the Electro-Alloys Division, American Brake Shoe Co., at the new $3-million high alloy foundry at Elyria, Ohio. Muffles, retorts, pots and similar type castings are X-ray examined. This is the larger of two such units

Action of IAM, UMW watched By Management

WASHINGTON — This largest of American Federation of Labor affiliates (on the basis of convention voting strength) took a walk out of the AFL almost two years ago. At the same time, a half million miners returned to the AFL fold.

Now speculation arises as to whether John L. Lewis will again pull his miners out because of his setback by the AFL's San Francisco convention. Anything Lewis does usually has repercussions elsewhere in the labor movement. What happens in the labor movement also has its effect on management. So management, as usual, has its eyes on the United Mine Workers president.

At the same time, management in metalworking industries has a special interest in program and objectives of the International Association of Machinists.

Important To Management

Whether the 625,000 machinists, tool and die makers, aircraft and railroad workers, maintenance and repairmen and just ordinary production workers who belong to IAM go back into the AFL is important to management only if, in the process, the jurisdictional wrinkles which beset employers are ironed out.

Right now, the IAM is riding high. Despite cutbacks in aircraft and shipbuilding, it boasts an increase of 100,000 members during 1946, its first year as an independent outfit.

This year, its organization drive continued without pause. In aircraft, it has tangled with the CIO's United Automobile Workers at Glenn L. Martin and other airframe plants. In garages, it competes for members with the UAW-CIO as well as the AFL street car and bus drivers.

Among millwrights, who erect plant machinery, IAM is faced with the claim of the carpenters union for jurisdiction. It blames this fight with "Big Bill" Hutcheson, boss of the carpenters, for its decision in January 1946, to withhold payment of $100,000 in annual per capita taxes to the AFL. This dispute dates back to the 1914 AFL convention.

Dispute with Engineers

A secondary cause of the defection is a dispute with the operating engineers over the adjustment of machinery during the trial run of a ship.

Nevertheless, the IAM shoots for a million members by next May 5, when it will be 60 years old. To prevent any slowing of the organizational pace, the union was the first to qualify under the Taft-Hartley for access to the election machinery of the National Labor Relations Board. President Harvey W. Brown and other international officers had no difficulty signing non-communist affidavits—the union bars communists from membership.

In the past two years, Brown has built up his organization for the tasks ahead. The union is developing a self-reliance. It launched a weekly newspaper, The Machinist, and improved the monthly journal. Took on a public relations director who kept Brown and the IAM in the public prints with comments on national issues.

IAM Trains Members

Traditionally, the IAM had trained its members from the ranks for positions of leadership and counsel. Now Brown has brought in outside experts for topside jobs, including economists, statisticians, educators and newspapermen. For legislative director, however, the IAM brought in one of its own. He is Joseph M. Tone, former Connecticut state Senator and, in 1944, candidate for the U. S. Senate. Tone is a former IAM Grand Lodge representative.

The union has done extensive work in apprentice training, the IAM program of organization, educating its membership and winning economic and other benefits for them is likely to continue unchanged regardless of the action on reaffiliation.

Names in the News

Victor Mancuso

D. F. Axelson, formerly vice president in charge of manufacturing for the Axelson Manufacturing Co., has retired. His position is being filled by **Victor Mancuso,** former works manager, who is maintaining headquarters in Los Angeles.

Edward A. Miner, production manager of The American Brass Co., Waterbury, Conn., retired Nov. 1 after 50 years continuous service with the firm.

C. S. Conrad has been appointed general manager of sale for Columbia Steel Co., San Francisco. He has been with Columbia for the past 15 years. Two assistant general managers of sales were also appointed—**W. B. Sawyer, Jr.,** in charge of administration and **Eric Barnett** in charge of distribution.

J. R. Doughty has been named manager of the export sales department of SKF Industries, Inc. He will continue as manager of the sales contract department.

Frank A. Learman has been named manager of the San Diego Convair division of Consolidated Vultee Aircraft Corp., succeeding Robert L. Mussen. He has been with the company for 18 years.

John F. Little has been appointed factory manager of General Instrument Corp., Elizabeth, N. J. He succeeds **T. E. Keller,** who has resigned recently.

Leicester L. Lewis, vice president of The Tabor Manufacturing Co., Philadelphia, has been named director of sales.

C. S. Coggeshall has been appointed manager of sales of the Turbine and Gear Divisions of the General Electric Apparatus Department. Also, **W. E. Saupe** has been named manager of the Schenectady Turbine Manufacturing Div., while **W. L. Young** is now manager of the Lynn Turbine and Gear Manufacturing Division.

Arthur Nikand has been appointed factory manager of the Portland, Ore., plant of the Hyster Co. He has been connected with Hyster for the past 13 years.

Frank R. O'Donnell has been named general manager of the Champion Forge Co., which recently acquired the assets of the Champion Machine & Forging Co., Cleveland. **Lester L. Reuse** has been placed in charge of sales for the firm.

Milton Roberts has been appointed director of purchasing for The Indian Motorcycle Co., Pres. Ralph B. Rodgers announced recently.

B. D. Claffey

B. D. Claffey has been elected executive vice president and general manager of Acme Aluminum Alloys, Inc., Dayton, Ohio.

Clyde A. Sluhan has been named manager of industrial sales for The Anderson Oil Co., Portland, Conn.

C. F. Jensky has been appointed general sales manager of the Besler Corp., Emeryville, Calif. He was formerly general sales manager of Joshua Hendy Iron Works and chief engineer and manager of the Turbine Department of Murray Iron Works.

P. R. Hatch has been placed in charge of the sales department of the Brown & Sharpe Mfg. Co., Providence, R. I., following the recent death of **C. W. Machon,** general sales manager.

Kenneth N. Stabeck has been named Minneapolis branch sales manager for Gerity-Michigan Corp., while **Robert W. Kennedy** is the new sales manager for the St. Louis branch.

W. H. Bollinger has been appointed exclusive representative for The Esterline-Angus Co., Inc., Indianapolis, Ind., in the Pittsburgh territory.

W. R. L'Hommedieu has been named sales representative for the Ward Leonard Electric Co. in the Los Angeles area. His headquarters are at 722 E. Washington Blvd., Room 303.

Jess W. Spiker has joined Penn Carbide and Alloy Casting Co., Elizabeth, Pa., as sales manager. He was formerly with Carbide Die & Mold Co., Pittsburgh.

Harry F. Anderson has been promoted from sales promotion manager to assistant to the president and chairman of the board of Willys-Overland Motors, Toledo, Ohio.

BUSINESS ITEMS

Morley Machinery Corp., Rochester, N. Y., has been purchased by **VanBuren H. Hansford. John G. Schalk** is vice president and general manager of the new firm.

Technical Appliance Corp. has moved from Flushing, N. Y., to its own plant at Sherburne, N. Y.

The Permanente Metals Corp. has moved into its new aluminum reduction plant at Tacoma, Wash. It will add an estimated 3.5 million lb. of aluminum pig to the company's production potential.

Hewitt Rubber Div. has appointed the Industrial Supply Co., Minneapolis, Minn. as distributor of its entire line in Minneapolis, St. Paul, Minn. and North and South Dakota.

Braun Gear Co. has moved its facilities to a new plant at 239 Richmond St., Brooklyn, N. Y.

Philadelphia Div. of **The Yale & Towne Mfg. Co.** has started moving into the new Yale Material Handling Machinery Bldg. at 205 E. 43 St., New York, which will house a complete materials handling maintenance garage and showrooms to repair, service and display its products.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has established a fifth field region for its general machinery division. Designated as the Empire region, it will include the area now covered by the New York, Buffalo, Syracuse and Newark offices. **Arch J. Cooper,** New York district office manager, will be in charge of the new region.

Lead-All Products Co., New York, has changed its name to the **Rumac Manufacturing Co.**

The F. A. Oliver Gear & Machine Co., Inc., Buffalo, has been purchased by **Weldon D. Smith,** who will actively manage the firm.

Robins Conveyor Div. of **Hewitt-Robins, Inc.,** Passaic, N. J., has appointed the **St. Louis Railway Supply Co.,** St. Louis, Mo., as its distributor in that area.

The Parker Appliance Co., Cleveland, has named **The Morman Belting and Supply Co.,** 522 W. State St., Milwaukee, as its distributor in Wisconsin.

Kennametal, Inc., Latrobe, Pa., has appointed K. W. Jonvik, Dronningens gt. 17, Oslo, Norway, as its representative.

Hartley Wire Die Co., Thomaston, Conn., has changed its name to **Hartley Tool & Die Co.**

General Electric Co. has established the Welding Equipment Divisions as integrated operating units within the Apparatus Department, which consolidates all the company's activities in the electric welding equipment field. The unit will be directed by a Welding Equipment Committee headed by **A. F. Vinson.**

OBITUARIES

John S. McCarthy, 70, formerly a production manager for Worthington Pump & Machinery Corp., Buffalo, died recently after a three-week illness. He had been associated with Worthington for 27 years.

C. L. Raisig, 57, chief engineer of sales of the Mesta Machinery Co., died suddenly Nov. 2.

John J. Norkus, president of the Norkus Machine and Manufacturing Co., Bridgeport, Conn., passed away Oct. 22.

Carl A. Channon, president of the Great Lakes Supply Corp., Chicago, died suddenly Oct. 9.

James G. Gomperts, head of the Thomas Tool Co., Bridgeport, Conn., died Oct. 21.

MEETINGS

American Society of Mechanical Engineers. Annual meeting. Atlantic City, N. J. Dec. 1-5. Ernest Hartford. executive assistant secretary, 29 West 39 St., New York.

National Association of Manufacturers. 52nd Congress of American Industry. New York. Dec. 3-5. NAM, 444 Madison Ave., New York

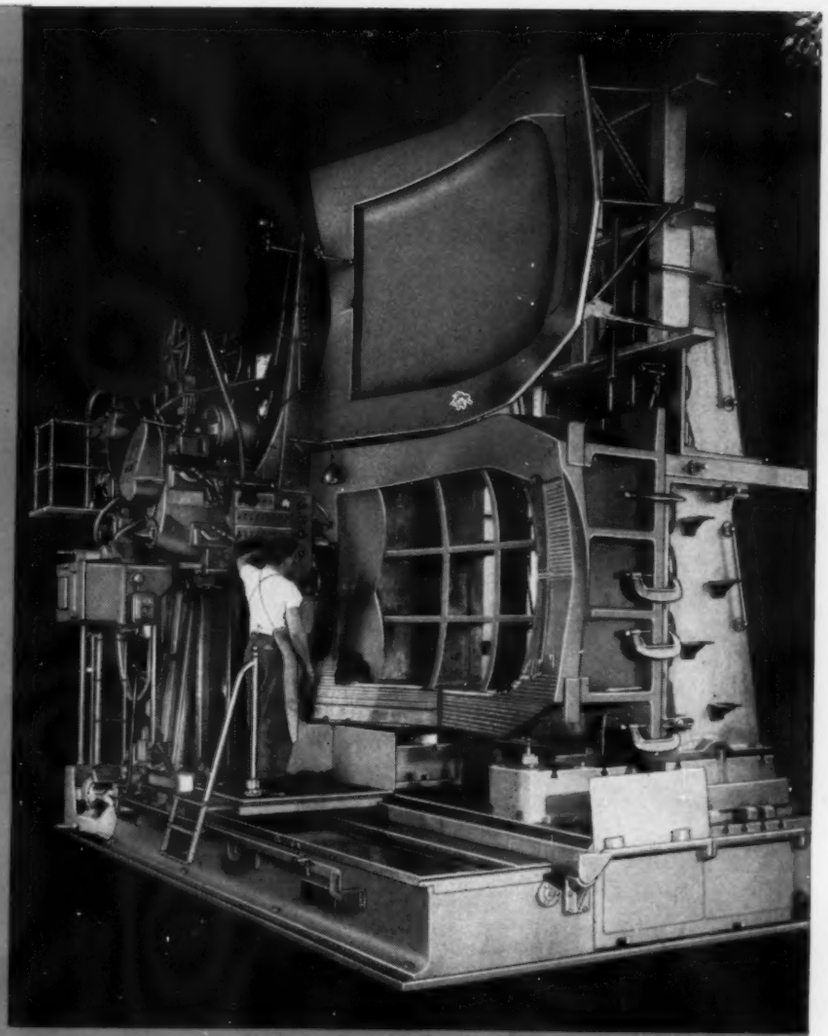
Materials Handling Exposition. Public Auditorium, Cleveland. Jan. 12-16. Clapp & Poliak, 350 Fifth Ave., New York.

Pressed Metal Institute. Annual meeting. Hotel Statler, Buffalo, N. Y. Feb. 10-11. Sam Morrison, vice president, Morrison Steel Products, Inc., Buffalo, chairman.

Society for Experimental Stress Analysis. Annual meeting. Hotel Pennsylvania, New York, Dec. 4-6. W. M. Murray, secretary-treasurer, Central Square Station, Cambridge 39, Mass.

Society of Automotive Engineers. Annual meeting. Book-Cadillac Hotel, Detroit. Jan. 12-16, 1948. John A. C. Warner, secretary and general manager, 29 West 39 St., New York.

BIG DIES



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the *Sheffield* corporation

Dayton 1, Ohio ***U. S. A.***

Sheffield MASTER CRAFTSMEN

2581

Sheffield's
principal products include

GAGES
MEASURING INSTRUMENTS
MACHINE TOOLS
THREADING TOOLS
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•

Standard Gages shipped within 24 hours

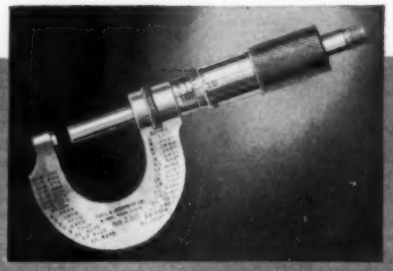
STARRETT TOOLS

Save PLANER and SHAPER Time With this STARRETT Precision Gage

Operators can make every first cut "on the nose" by setting planer and shaper tools with Starrett No. 599 Planer and Shaper Gage. Used with a micrometer or Vernier Caliper, it will gage with extreme accuracy within its range of ¼ to 6½ inches. Also serves as a universal height gage and gap gage. Alignment and parallelism of ends, sides and work contacts held to close limits — lateral play eliminated by angular slide ways. Note handy level.

AS NECESSARY AS SKILLED MEN

Leading shops rate STARRETT Vernier Tools high on their list of essential shop equipment. STARRETT Vernier Caliper No. 122 (shown above) is a sound, long-term investment in dependable, uniform accuracy. Sharp, clean-cut, easy-reading graduations; perfect workmanship, finish and balance — all guaranteed by the STARRETT reputation.



SYMBOL OF SAFE, SURE ACCURACY

STARRETT Micrometers are indispensable equipment for skilled craftsmen in tool rooms, in the shop, at the inspection bench. STARRETT No. 230 shown above measures by thousandths up to one inch, can be ordered chromium plated for stain resistance, long wear, easy reading. More than 300 different models and sizes in the complete Starrett line make it easy to select the one best micrometer for any job.

Write for Complete Starrett Catalog No. 26 "C"

Buy Through Your Distributor

THE L. S. STARRETT CO. · ATHOL, MASSACHUSETTS · U. S. A.

World's Greatest Toolmakers

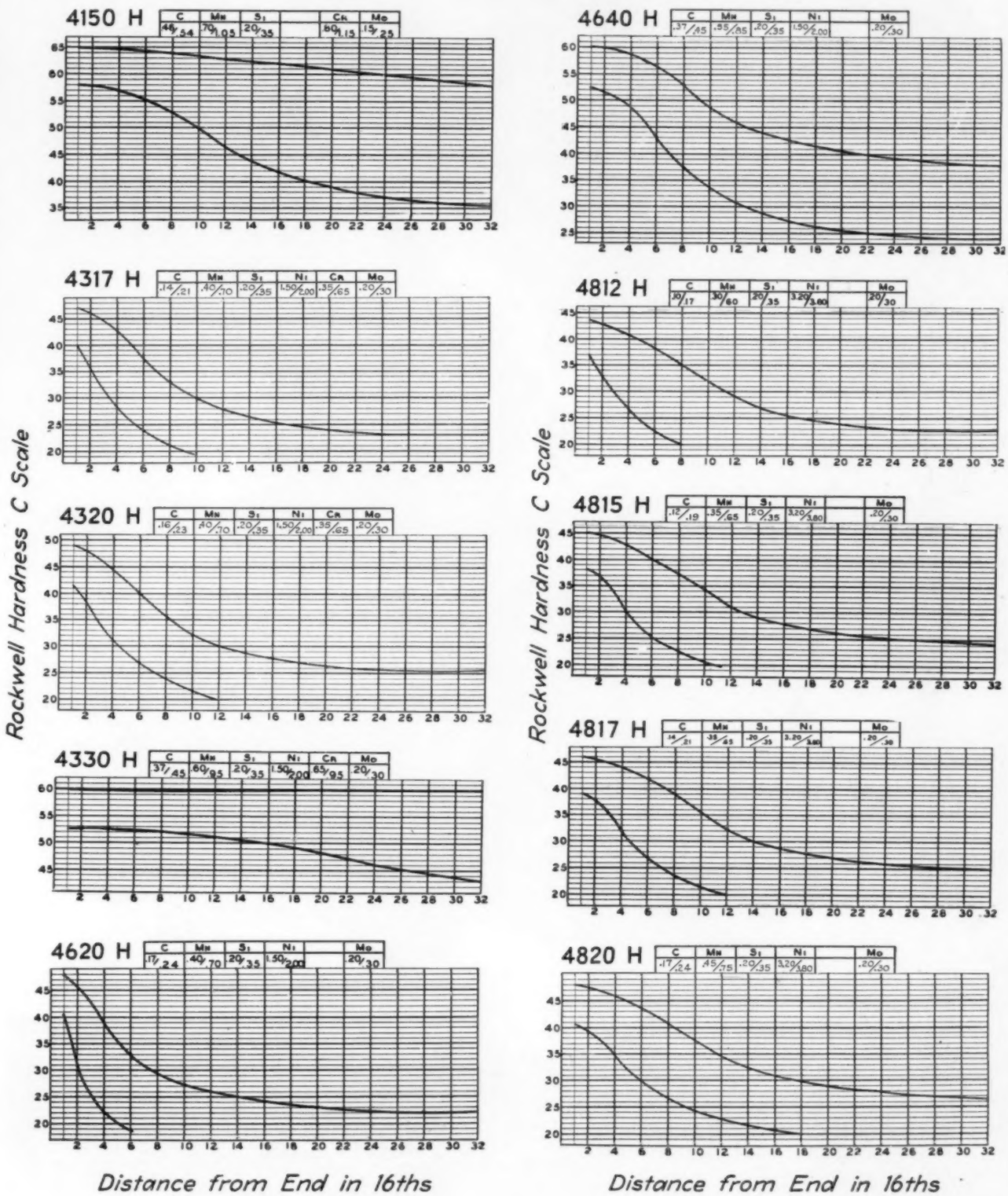
STARRETT

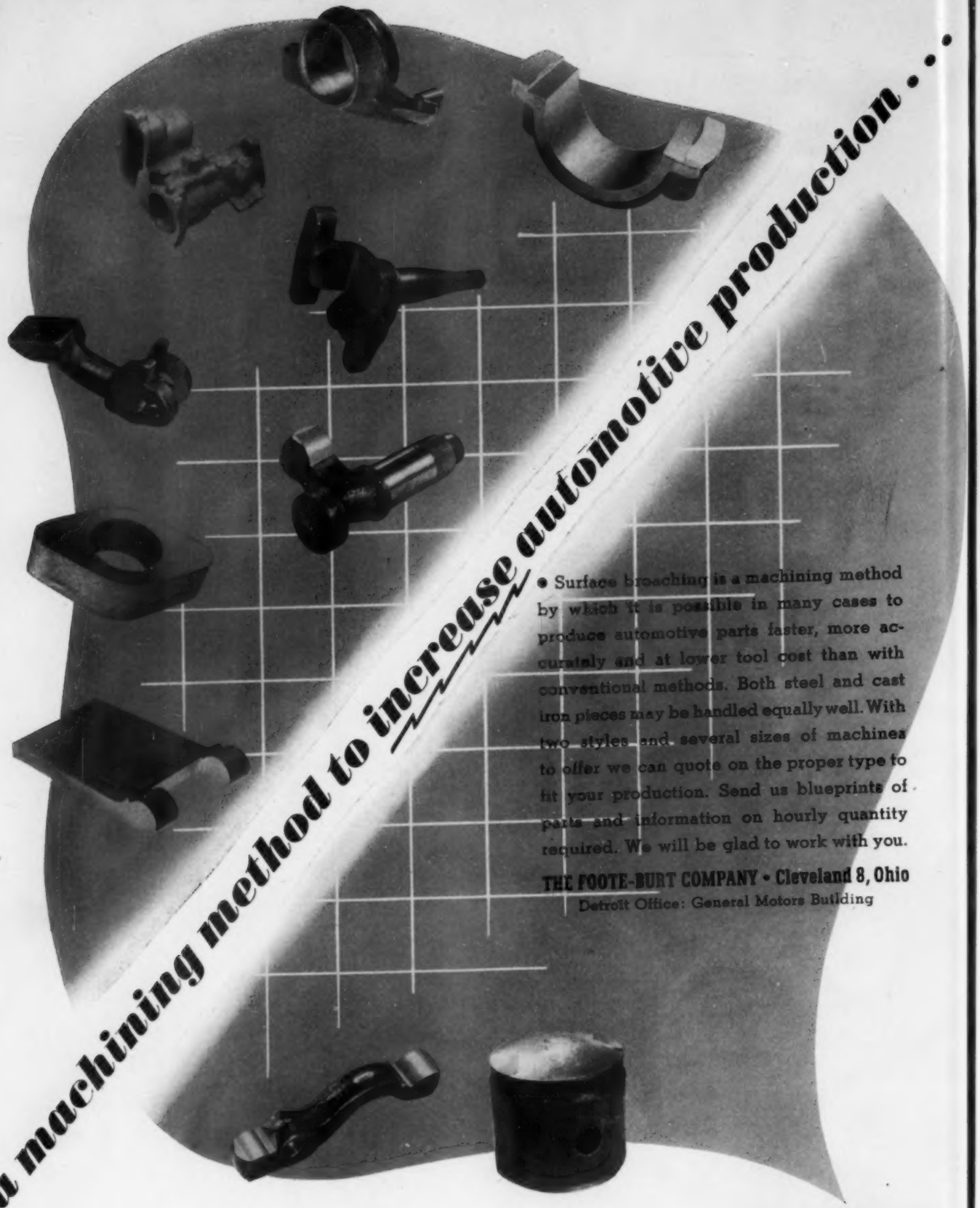
PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK

HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

Hardenability Bands for H-Steels—IV

COURTESY AMERICAN IRON & STEEL INSTITUTE AND SOCIETY OF AUTOMOTIVE ENGINEERS





a machining method to increase automotive production . . .

• Surface broaching is a machining method by which it is possible in many cases to produce automotive parts faster, more accurately and at lower tool cost than with conventional methods. Both steel and cast iron pieces may be handled equally well. With two styles and several sizes of machines to offer we can quote on the proper type to fit your production. Send us blueprints of parts and information on hourly quantity required. We will be glad to work with you.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

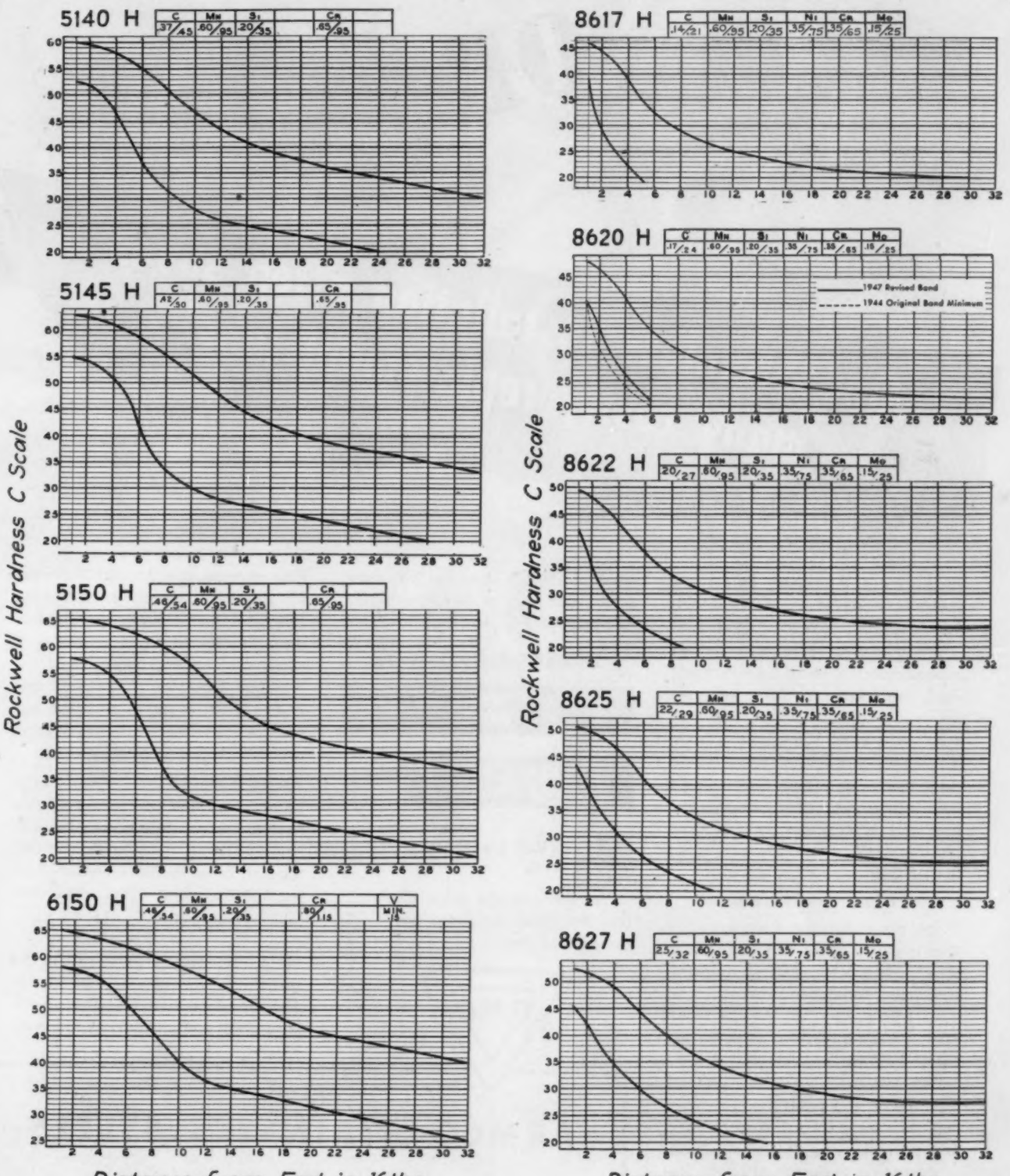
Detroit Office: General Motors Building

FOOTBURT

Surface Broaching

FOOTBURT PATENTED TOOTH FORM

Hardenability Bands for H-Steels—V



1 bill or ?

One Stainless installation often saves many costly replacement jobs!

Today more than ever before it's sound economy to use ARMCO Stainless Steels.

When you use these rustless steels in equipment, maintenance and repair work you'll have far fewer replacements . . . *much less repetition of high installation costs.* (One case in point is spinning wire for telephone cable suspensions. In actual atmospheric field tests along highly corrosive rail lines and water routes, ARMCO Stainless Steel Wire lasts 3 to 5 times longer than heavily coated wire.)

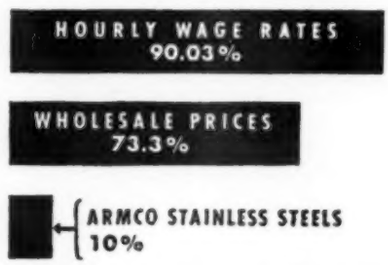
Figure Your Savings

If you are using short-lived materials that last only a few months or years, think how many costly future installation and maintenance bills you can save by switching to ARMCO Stainless. In many applications this rustless metal will last indefinitely.

Stainless costs less in the long run because it eliminates budget-draining manpower costs that represent a big part of every replacement job.

According to Bureau of Labor Statistics these costs (hourly wage rates) *went up* 90.03%, and the wholesale price index of all materials increased 73.3% from 1937 to April, 1947.

INCREASES (1937-1947)



Yet the average price of ARMCO Stainless Steel increased only 10% during that time.

Plan now to use ARMCO Stainless for equipment, maintenance and repair work, and consumer products as well. Besides saving you money it gives you many other advantages: excellent resistance to heat and corrosion, great strength, attractive appearance, and decided sales appeal.

Quick Deliveries

ARMCO Stainless Steel sheets, strip, plates, bars and wire are available now for quick deliveries. Call our nearest district office or Armco Distributor, or write The American Rolling Mill Company, 388 Curtis Street, Middletown, Ohio.

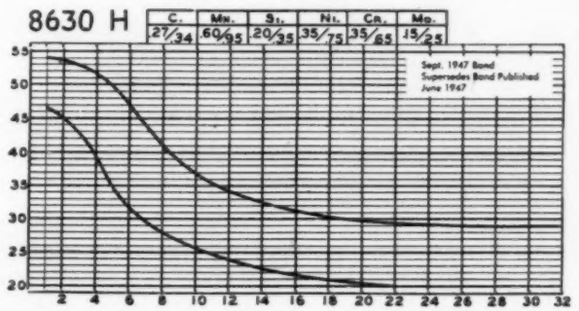
* * *

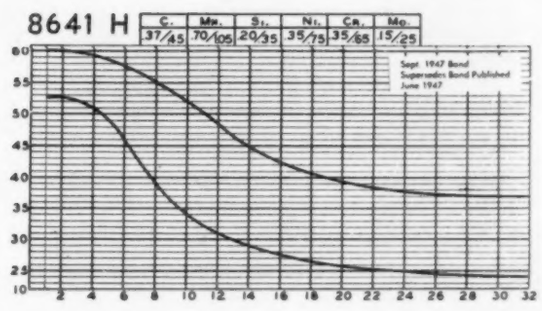
Help keep steel flowing from the mills by turning in your scrap. The need is critical—the shortage *greater* than during the war.

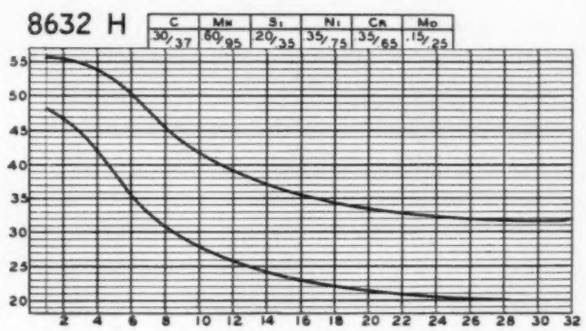
ARMCO

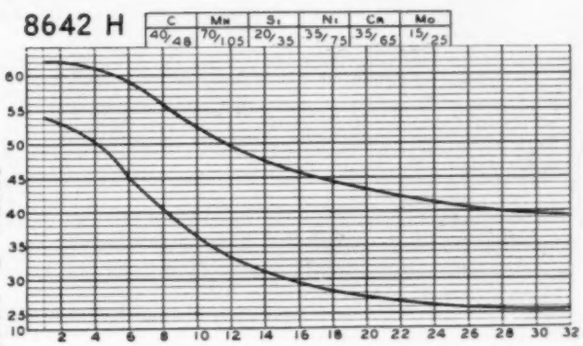
ARMCO STAINLESS STEELS

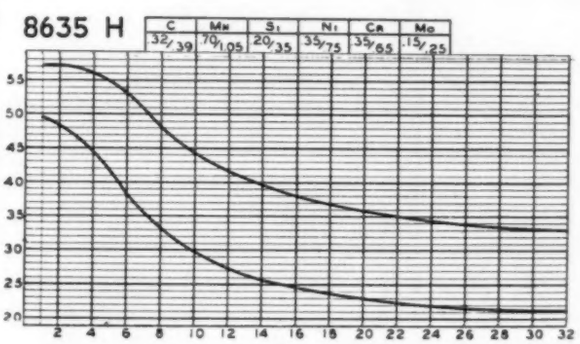
Hardenability Bands for H-Steels—VI

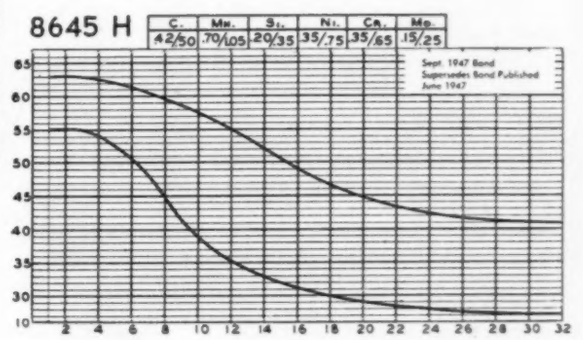


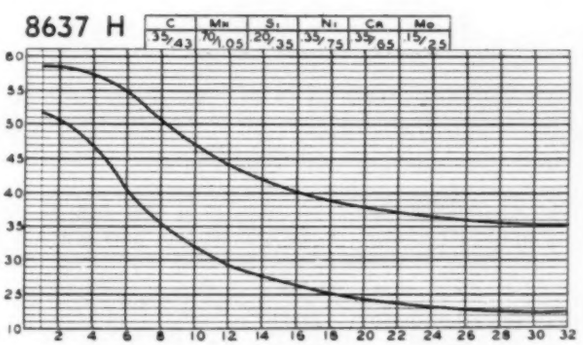


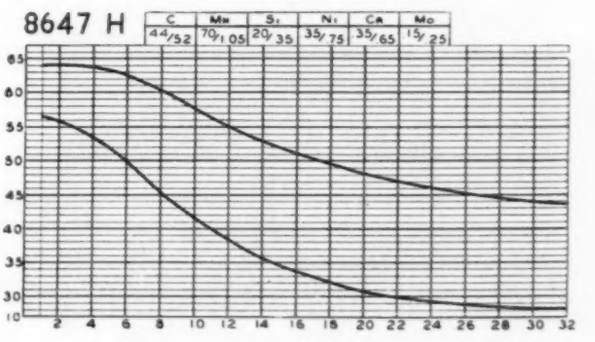












Rockwell Hardness C Scale

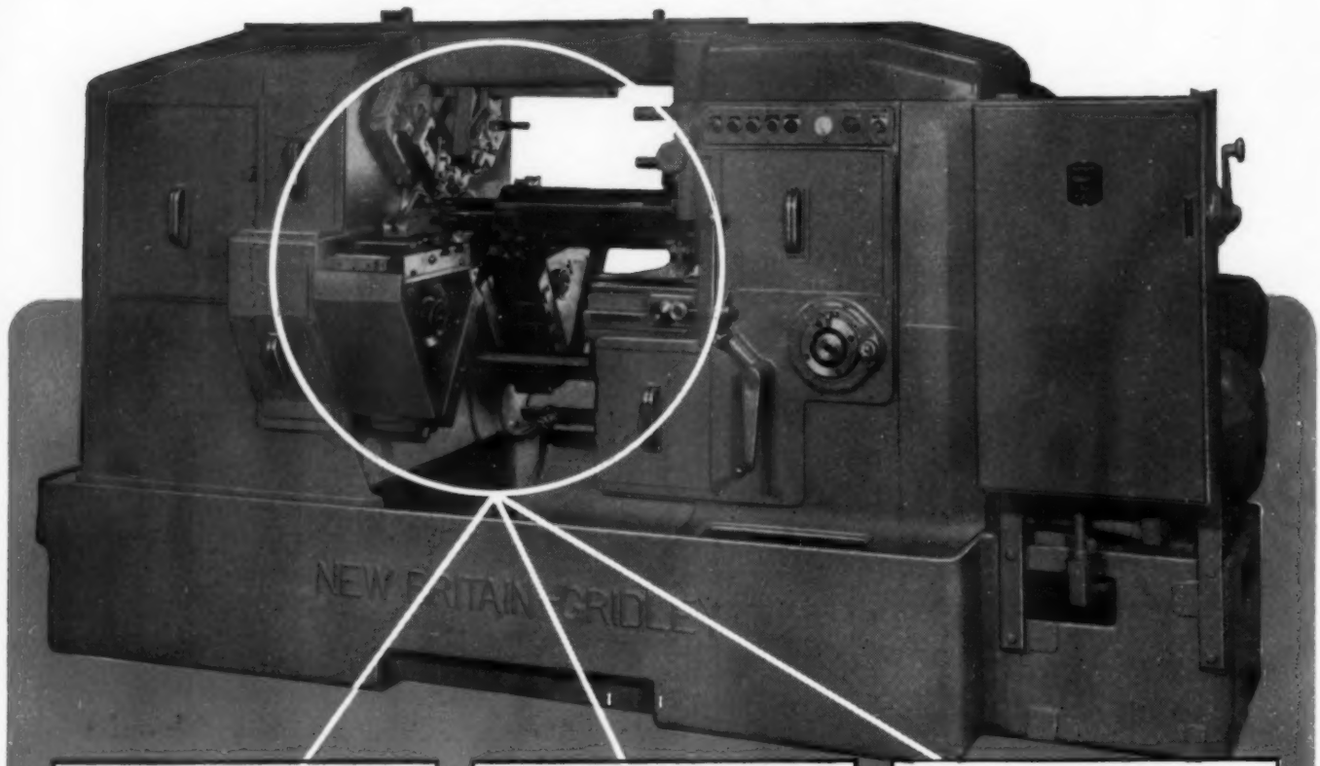
Distance from End in 16ths

Rockwell Hardness C Scale

Distance from End in 16ths

NEW BRITAIN'S NEW LINE OF SCREW MACHINES

Answers the Need for Lower Costs and Higher Productivity



QUICK SET UP

1. No cam to change for main tool slide. Strong, positive universal cam selects feed stroke without changing high point, stops or total stroke.
2. No cam to change when adjusting stock feed-out length.
3. Cross slide cams directly behind slides minimizing linkage. Remove three screws with cover and cams pull off.
4. Micrometer adjustment in both directions on all cross slides, all independent of stops.

SYMMETRICAL RADIAL TOOLING

1. Five heavy-duty forming slides and cut off slide evenly spaced about carrier making line of forming thrust identical in each position.
2. Tool holders interchangeable among forming slides, also on main tool slide.
3. Greatly increased chip clearance and capacity so essential with carbides.
4. Flexibility for auxiliary threading attachments. Accelerating drives in every position.

FOOLPROOF, AUTOMATIC OPERATION

1. Shoulder height, complete control panels at front and rear of machine.
2. Automatic stop shuts off machine and flashes red light when spindle is empty.
3. Program wheel on outside of powercase shows complete cycle of machine.
4. Machine stops if lubricating oil pressure is low.
5. Gage indicates when machine is operating at other than normal load.

Fast, powerful machines which will outperform anything modern tools will handle and anticipate future tool developments. These new machines with their initial and permanent accuracy also incorporate all the previous exclusive features by which NEW BRITAINS are recognized. To these qualities have been added new features, making it possible to accomplish quick setups where short runs are the rule. Built massive to handle the horsepower required for steady feeds for carbides on tough forming steel jobs, they are also designed for super high-spindle speeds, essential for brass and aluminum. Six spindles up to 2¼" capacity.

THE NEW BRITAIN MACHINE CO.

NB

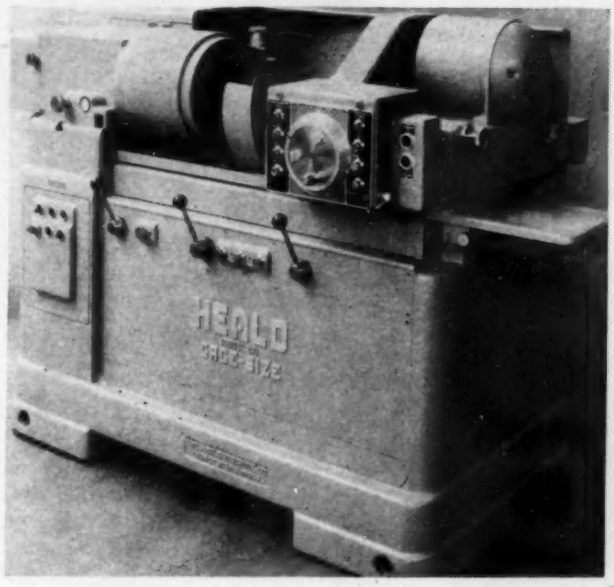
NEW BRITAIN

Automatics

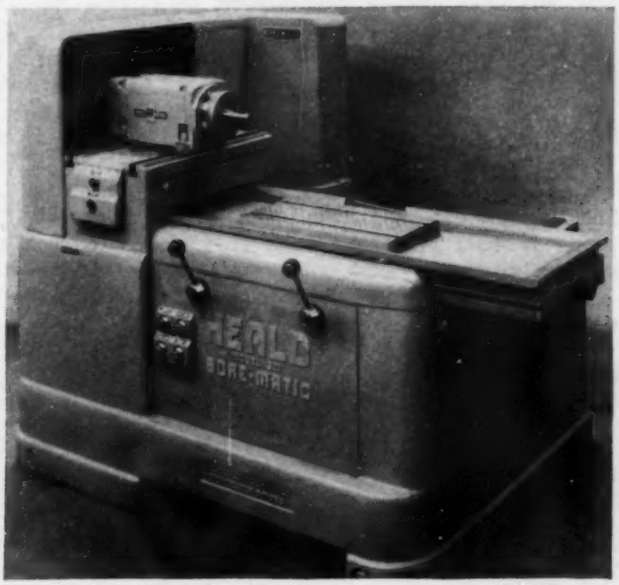
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

M-01062

Shop Equipment News



A sealed wheel-truing unit on the grinders permits the use of short spindles



Model 321 single-end Bore-Matic is designed low for easy loading of work

Two Internal Grinders, Four Bore-Matics Made by Heald

The Heald Machine Co., Worcester 6, Mass., has announced new grinding and boring machines. In the grinding line are Models 271 and 371 chuck-type internal-grinding machines. The boring machines are Models 221 and 321 (single-end) and 222 and 322 (double-end) Bore-Matic precision finishing machines.

The grinding and boring machines incorporate common features. All are hydraulic and are said to operate independent of oil temperature. Thus accuracy can be maintained without depending on the attention of the operator in adjusting feeds. Motor and pumps are mounted off the machines to avoid vibration and keep warm oil out of contact with the base. Improved idlers, cylinders, and automatic way lubrication provide smooth table motion. Hydraulic-power units can be rolled out of the machines.

New wheelheads, workheads and boringheads are permanently lubricated and sealed, and heat rise is said to be cut approximately in half. A large variety of different cycles can be obtained from the same standard units. This is aided by convenient location and easy operation of controls.

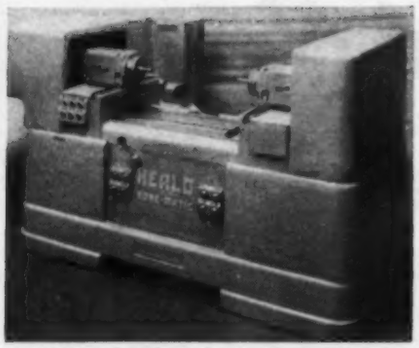
The two internal-grinding machines are exactly alike except for size. Model 271 has a 15-in. swing over the table, 5-in. maximum length of hole and 5-in. maximum dia. of hole. Model 371 has 16½-in. swing, 10-in. maximum length of hole and 6-in. maximum dia. of hole. Wheelheads used on the units are of any one speed and are selected to suit the job.

The grinding machines can be furnished in Gage-Matic, Size-Matic or combination models. The automatic-sizing feature covers every element of the grinding cycle except loading and unloading of work. Size-Matic sizing is by advancing the wheel a predetermined distance beyond the wheel-truing position. Holes can be ground straight or tapered, with or without keyways, tapered or blind, by this method. Gage-Matic sizing uses solid gages of required size which test the hole after each pass of the grinding wheel, and it can be used on straight open holes, with or without keyways or splines.

The feed mechanism on the grinders is arranged so that roughing and finishing rates of feed, the amount of feed, as well as retraction, compensation and rapid approach are set by turning graduated knobs on the feed box. An indicator shows when belt tension is correct for the size of wheelhead used. Table dogs are enclosed while the machine operates and are adjustable without tools.

The four Bore-Matics are designed for medium and large work. They can be arranged with single or multiple spindles, and can do rough and finish boring, turning, facing, chamfering, grooving or fly-cutting. They can be used for mass production of a single part requiring several operations, or for single or multiple operations on more than one part simultaneously.

Models 221 and 321 single-end Bore-Matics are alike except for size. Width of bridges is 20 and 23⅝ in. respectively, and maximum table travel is 15 and 20 in. Standard direct head-drive motor for Model 221 is 3 hp. and for Model 321 is 5

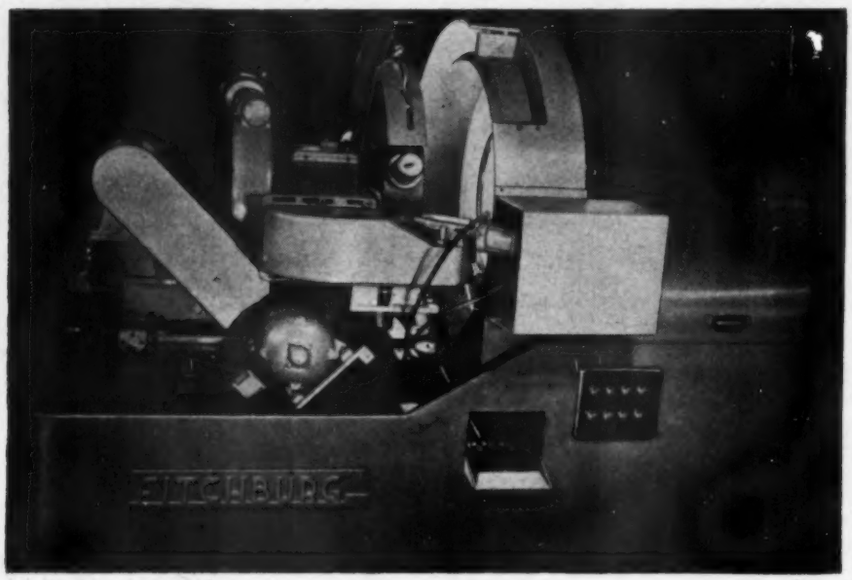


Double-end Bore-Matic is similar in design to the single-end units

hp. Maximum speed for the boringheads is 4000 and 2500 rpm. respectively.

The double-end boring machines are similar to the single-end units. Both double-end models are also alike except for size, Model 222 being the smaller. The boringhead-drive motors for Models 222 and 322 are the same as for Models 221 and 321, except that there are two per unit. Speed thus is the same for the smaller machine of each type, as well as for the larger. The same is also true for table feeds, boringhead sizes, and capacities (except that maximum table travel on Model 322 is 16 in. as compared to 20 in. on Model 321).

Table rapid traverse for the smaller boring machines is 35 fpm. and is 23 fpm. on the larger. All units are equipped for two-way boring with different feeds in the two directions if desired. Reverse dog and positive stop are adjusted as one. Tools are all the same hand.



Several Parts in Constant Contact With Wheel of Fitchburg Grinder

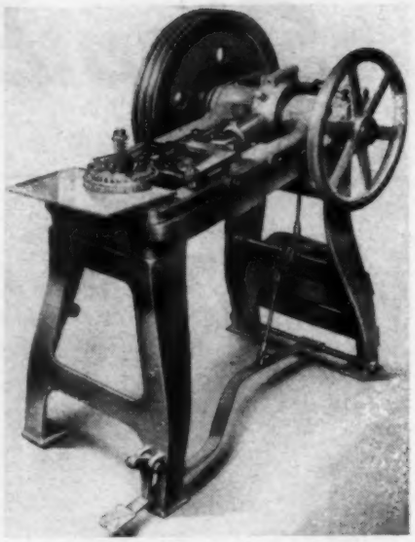
Consta-Contac grinding, by which three or more parts are in constant contact with a single grinding wheel, is the method used on a machine made by Fitchburg Grinding Machine Corp., Falulah Rd., Fitchburg, Mass. The unit is said to grind automotive engine-valve seats at the rate of 2,160 per hr.

The arrangement of the machine comprises a vertical grinding wheel, belt-driven, and a vertical turret having 12 spindles to receive the valve stems. Loading and unloading are automatic. The grinding wheel rotates at 5,000 sfpm. and the valves at 80 to 110 sfpm.

The vertical plane of the turret axis is set at a slight angle to the wheel axis. This angle is selected so that at top center the grinding-wheel edge is separated from the valve-face path by a distance equal to the average amount of stock to be removed. The angle is altered by pivoting the table carrying the turret.

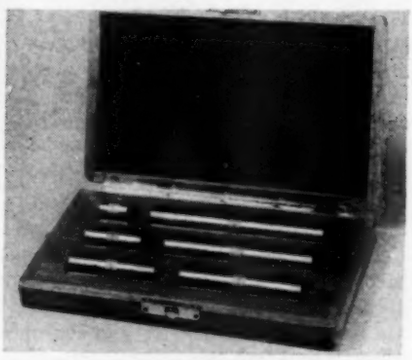
The table is adjusted longitudinally in order to secure contact of the rough valve seat with the grinding wheel at top center. As the spindle turret rotates to carry the valve downward, the valve feeds across the beveled face of the wheel. A cam releases the work-holder to drop the valve onto a belt conveyor.

An automatic truing device allows dressing of the wheel with only momentary interruption of loading.



Automatic Ejection of Work with Dunbar & Cook Horizontal Press

The Dunbar & Cook 10-ton horizontal press is marketed in this country by British Machine Tools, Ltd., 367 Diamond Bridge Ave., Hawthorne, N. J. It is designed for piercing, marking, forming and blanking of small components. It is extremely compact and can be fitted with dial, roll or gripper feed and operated at from 70 to 200 rpm. depending on type feed used. An automatic ejection mechanism for completed work is incorporated.



Van Keuren Microgage Set M-21 Makes Combinations to 21 in.

Van Keuren Co., 176 Waltham St., Watertown, Mass., introduces a set of microgages, No. M-21, which is designed for setting large micrometers. The set includes 1-, 2-, 3-, 4-, 5-, and 6-in. microgages which have ⅞-in. dia. Microgages up to 1 in. are held within a tolerance of 20 millionths of an inch. The remaining gages are held within a tolerance of 15 millionths of an inch per inch of length. The set will make combinations to 21 in.

"Accuracy *Very Good* OVER WIDE RANGE OF WORK"

REPORTS SCHUTTE KOERTING PHILADELPHIA PA

LODGE & SHIPLEY LATHES at work...

Widely known as a manufacturer of equipment for the power and process industries, Schutte and Koerting Company, Philadelphia, use their Lodge & Shipley Lathes in the production of spindles, bushings, headers, covers, bundles, tails, nozzles and bodies. These parts go into valves, condensers, jet and heat transfer mechanisms sold throughout the world.

In the photo above, a stuffing box for an 18″ valve is being machined on an 18″ Lodge & Shipley Selective Head Engine Lathe. Electric steel, stainless steel, bronze, nitroloy, brass and cast iron are turned, bored, faced and threaded, using high speed steel and carbide tipped tools. The exceptional rigidity and horsepower of these precision lathes enable this noted manufacturer to gain the maximum in speed from modern cutting tools.

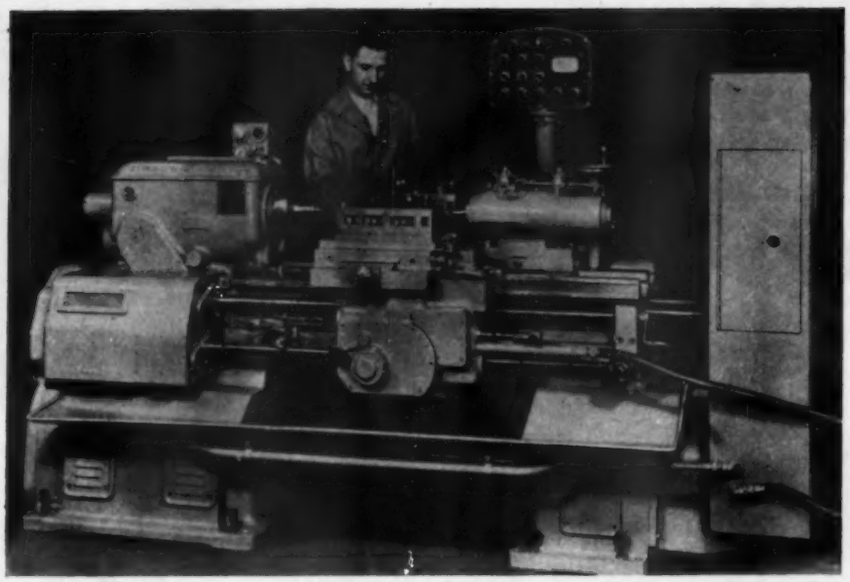
The power, versatility and economy of Lodge & Shipley Lathes can be a significant profit factor in your plant. Lodge & Shipley Engineers will gladly explain how . . . show you these fine lathes at work in nearby plants. Write for Condensed Catalog.

THE **Lodge & Shipley** COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.



Except for loading and unloading, the cycle is automatic on this lathe. The operator can stop or reverse cycle at any time

Electronically Controlled Feeds On Monarch's Magna-Matic Lathe

The Magna-Matic lathe featuring electronically-controlled feeds and an automatic cycle has been announced by Monarch Machine Tool Co., Sidney, Ohio. The lathe is equipped with both front and rear carriage, each of which may be single or multiple tooled. Facing, necking, forming, and chamfering are operations ordinarily assigned to the rear carriage. Diameters and lengths with intervening tapers or contours may be turned by utilizing the front carriage, which also does facing and boring. Short set-up time enables automatic-cycle basis for small lots.

Drive to the spindle is through multiple V-belts and pickoff gears. Although usually powered with a 10-hp., 1200- or 1800-rpm. motor, certain jobs require a 15-hp. motor which can also be accommodated in the base.

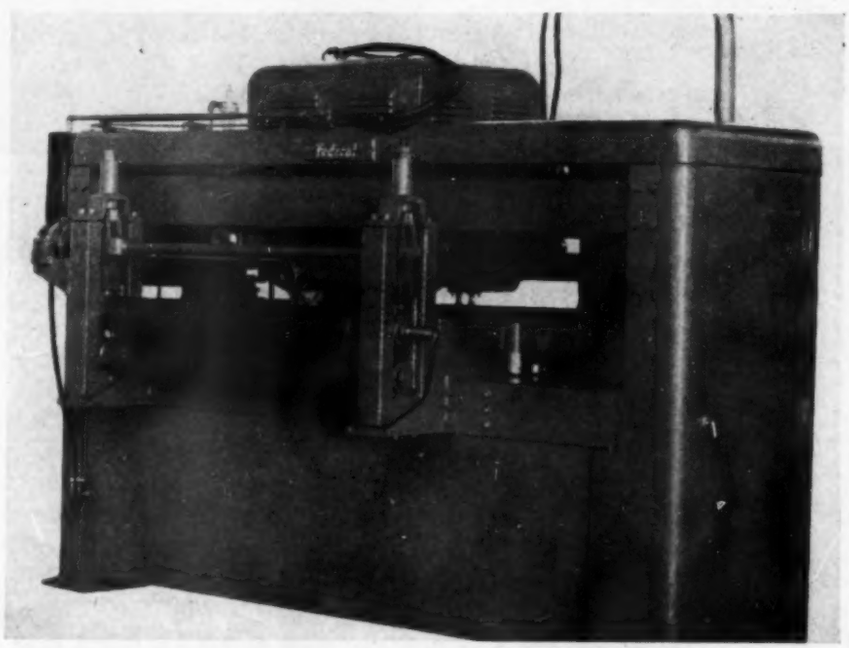
An automatic speed stepdown is available from any given pickoff-gear combination. The ratio is 6:1. Speed stepdown can take place at any time during the machining cycle, although ordinarily employed during the rear-carriage operations. An air-operated, electrically controlled multiple-disk clutch is responsible for this feature.

Four speed ranges, when using a 1200-rpm. motor, will take care of most requirements. The high of the first of these ranges is 180 to 610 rpm.; low is 30 to 102 rpm. This increases progressively to the fourth range where the high is 266 to 900 rpm.; the low 44 to 55 rpm. When higher speeds are required an 1800-rpm. motor is used. All ranges can be varied considerably by changing to a motor sheave of other diameter.

The machine also features electronically controlled feed motors. Front-carriage operation requires two motors, while the rear carriage uses one. This method gives infinitely variable feed ranges and is said to provide practically constant feed, regardless of load variation. The front carriage has a longitudinal feed range of 0.5 to 20 ipm. and a longitudinal traverse of 80 ipm. Cross-feed range is 1 to 40 ipm. Cross-feed range of the rear carriage is 0.5 to 20 ipm. The rear carriage can be made to become operative at any time after the start of the cycle.

When a single-point turning tool is used in the front carriage, it can be guided by one of four methods. In the first, gage blocks are clamped to a rail at the front of the machine to the right of the headstock. This method is recommended on medium-quantity, non-repetitive work. Another method for the same class work is to use micrometer heads which are mounted on the same rail. The third method, mounting of a templet on the rail, is recommended for repetitive work. The fourth method is the use of a cam bar, which is required for many classes of taper work.

A direct-reading scale enables the operator to position the tailstock. The Magna-Matic has a swing of 15 in. over the bed and 7 in. over the carriage. It is available in center distances of 18, 30, 42, 54, and 60 in.



DOUBLE-ROLL TRAVELING-HEAD series seam welder has been introduced by Federal Machine and Welder Co., Warren, Ohio. Designed for joining strip ends or skelps for long machine runs, the machine is available in four sizes for welding 38-, 48-, 56- or 66-in. line either right- or left-handed. Change-speed gear gives selective speed range of 10 to 27 or 20 to 54 fpm.

LOW RAKE *means . . .*

STEELWELD
LOW RAKE ANGLE
HIGH RAKE ANGLE
SHORT SECTION UNDER PRESSURE DURING CUTTING
MORE BENDING WITH HIGH RAKE
LOW RAKE ANGLE
LONG SECTION UNDER PRESSURE DURING CUTTING
LESS BENDING WITH LOW RAKE

Built in all sizes for cutting thicknesses of 12 gauge to 1¼ inch and lengths up to 18 feet.

LESS

TWIST Excessive bending during cutting is the major cause of twist in pieces sheared. There is a direct relation between bending and the rake or shear angle of the upper knife. A high rake bends a piece MORE than a low rake because a SHORTER section of the stock is under pressure during cutting.

CAMBER Departure of the edges of a strip from a straight line is called camber. An important factor in causing camber is high rake which tends to rotate a sheet during cutting.

BOW Bow is deformation in a direction perpendicular to the surface of a strip. Here again experience shows that low rake gives the best results.

WHEN CUTTING WITH STEELWELD SHEARS

MORE is required of a shear than the power to cut, to achieve precision shearing. A great deal depends on how the cut is made if parts cut are going to fit accurately without additional work.

For this reason rake, or knife shear angle has been made very low on all Steelweld Shears. This of course requires more driving power and consequently a larger driving motor and heavier construction throughout than would be necessary with a higher rake. But it minimizes twist, camber and bow in pieces cut.

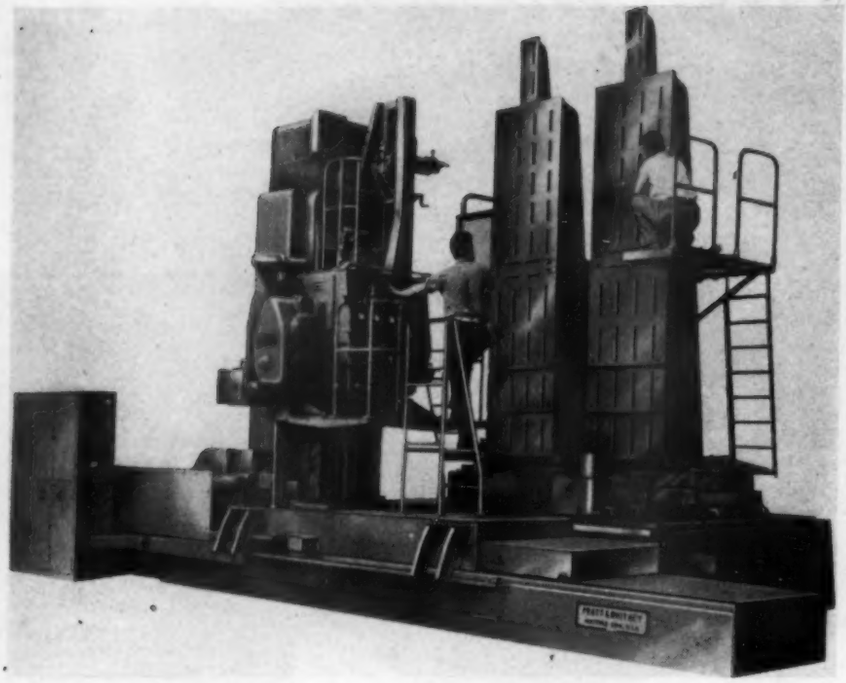
Because of low rake and also because of the ease with which knife clearance is adjusted to suit every plate thickness, cuts made on Steelweld shears are unusually smooth, straight and true.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
1404 EAST 282 ST. WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS



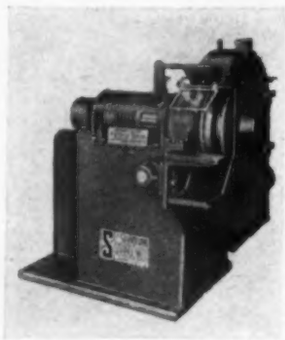
Pratt & Whitney Type BG-22 Keller Mills Dies 10 ft. Long, 5 ft. High

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn., announces Type BG-22 Keller machine for tracer-controlled milling. The machine produces large dies from three-dimensional models, or profiles a job in two dimensions. In each case, as the tracer passes over the master form, the cutter duplicates its path precisely in the work. It can machine automotive body dies 10 ft. long and 5 ft. high.

The machine is controlled from one main operating station on the spindle head with all controls concentrated in one panel at this station. An upper platform or station is provided above the main station for convenience of the operator when setting the tracer and when making other setup adjustments. All starters, relays and other electrical apparatus necessary to the operation of the machine are concentrated in one control cabinet permanently mounted at the left end of the machine bed.

The BG-22 will operate from any conventional polyphase source of power. It has a horizontal travel of 120 in., a vertical travel of 60 in., and an 18-in. transverse travel with an additional 6 in. obtained by means of transverse spindle adjustment. Table-working surface is 150x92 in.

Standard spindle speeds range in 14 changes from 20 to 1200 rpm. Horizontal and vertical feed rates range from ½ to 30 ipm.; horizontal and vertical fast traverse rates are 250 ipm.; and transverse travel rates range from 3 to 30 ipm. The machine requires approx. 15 hp., weighs about 50 tons with regular equipment and angle plate fixtures, and its over-all dimensions are 30 ft. long, 16 ft. deep and 18 ft. high.



Single-End Snagging Grinder Equipped with Speed Control

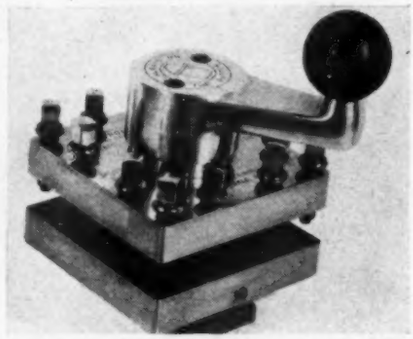
The Standard Electrical Tool Co., 2480 W. 6th St., Cincinnati 4, Ohio, has introduced a single-end snagging grinder with interlocking speed control to prevent overspeeding of wheel. It is available either for right- or left-hand operation, for vitrified- or resinoid-bond wheels, and in sizes for 10- to 30-in. wheels.

Monarch Type A "Air Tracer" For Turning, Boring, Facing

The Type A "Air Tracer" has been developed by Monarch Machine Tool Co., Sidney, Ohio, to perform work beyond the versatility of the Type B unit (*AM* Feb. 13, 1947, p. 176). The new unit employs two hydraulic cylinders instead of one: one controls cross movement and the other controls longitudinal movement of the cutting tool. The toolslides are set at a 90° angle on the Type A unit, as contrasted to the 45° angle on the Type B.

A spring-loaded air-tracer device, working on the air-gaging principle, scans a templet or master. Air loading pressure, established by the position of the tracer, controls movement of the cutting tool through two hydraulic relay valves.

The attachment is available on Monarch 10-in. precision manufacturing lathes and on all sizes of Model 60 engine and toolmaker's lathes. It is said to permit a constant feed rate to be maintained on both increasing and decreasing contours and on square shoulders, whether the cut is being taken on out- or in-feed. Intricate boring operations can also be handled.



Tripoint Turret by Beekman Has Twelve-Position Indexing

A self-indexing turret toolholder called the Tripoint Turret has been announced by Beekman Engineering Co., 1927 S.W. 1st Ave., Fort Lauderdale, Fla. It is quickly attached to any lathe for turning, boring, threading, facing and cutting-off operations.

Accuracy to split-thousandths is said to be possible. Twelve-position indexing gives three working positions for each tool. A combination cam and thread-locking device permits unlocking, indexing and relocking toolblock with a half turn of the operating handle. The toolblock is 3½ in. square.

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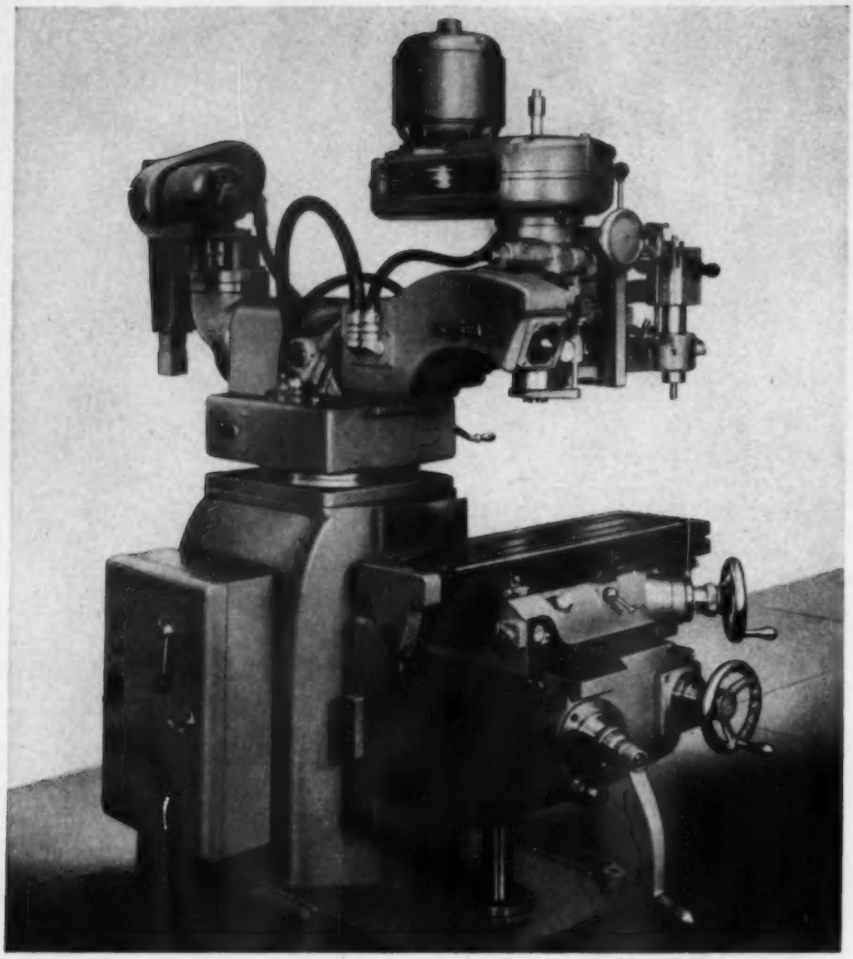


A single lever at the front of the machine selects high or low series of spindle speeds and direction of spindle rotation

Hydraulic Tracer Duplicates Shapes On Cincinnati Tool and Die Miller

Cincinnati Milling Machine Co., Cincinanti, Ohio, announces the 8x18-in. Tool and Die Milling machine, designed for production of plastic molds, permanent molds, metal patterns, die-casting dies, and small drop-forging dies.

A sensitive hydraulic tracer mechanism provides automatic duplication of intricate shapes. The tracer-finger contact pressure is light enough to permit the use of wood, plaster of paris or other soft materials for the master shape.

The tracer mechanism can be disconnected from spindle carrier by a single bolt for general vertical-milling operations. The mechanism also can be entirely removed from the spindle carrier and mounted on a supporting bracket on the column without disconnecting any of the hydraulic lines.

Pickfeed for saddle movement is available, reducing indexing time from cut to cut and providing evenly spaced feed progression lines. The spindle carrier is mounted on a transversely adjustable ram, the rear portion of which is provided with a mounting surface for a slotting attachment. The ram is in turn mounted on a swiveling turret which permits the slotting attachment to be swung into position over the machine table. This attachment is universally mounted on a double swivel and has its own individual motor drive.

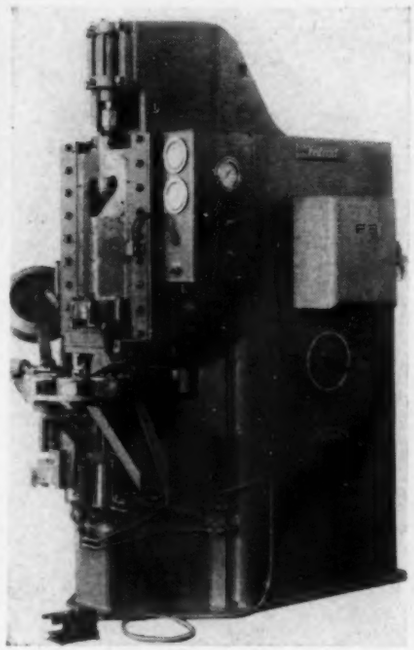
Flexible spindle-quill positioning with a slow-feed handwheel control for boring operations and rapid lever positioning for use as a sensitive drill are included. A dial-indicator depth gage provides for accurate visual indication of vertical adjustments of cutter.

Adjustable limiting stops, with micrometer screw adjustment, are provided for saddle and table movements for positioning of slides for repetitive cuts.

The hydraulic circuit involves three hydraulic lines between the pump unit and the tracer mechanism. Ten spindle speeds are available, ranging from 225 to 4000 rpm.

Hydraulic Power Feed Makes Canedy-Otto Drill Automatic

Canedy-Otto Mfg. Co., Chicago Heights, Ill., announces a hydraulic power feed for its sliding-head model drillpresses. The attachment makes the machine fully automatic, instead of semi-automatic as at present. The feed can be operated automatically, semi-automatically or manually. It is provided with adjustment for obtaining various rates of feed and can provide reciprocating action to the spindle. Units equipped with this feed may be used for honing, lapping, tapping and drilling.



Federal's Projection Welder Provided with Eight Stations

Federal Machine and Welder Co., Warren, Ohio, announces a high-production welder designed for welding gasoline-engine push-rod assemblies at the rate of 1200 per hr. Listed as PH4-12 hydraulic projection welder, it has an eight-station automatic-dial-feed table equipped with indexing and locking devices. The unit is furnished with eight welding fixtures, and equipped with an automatic hopper feed for feeding disks continuously.

You can cut
SHAPES LIKE THESE
faster, more accurately, at lower cost

ON THE MICHIGAN

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SHAPER

a gear shaper, a contour former,
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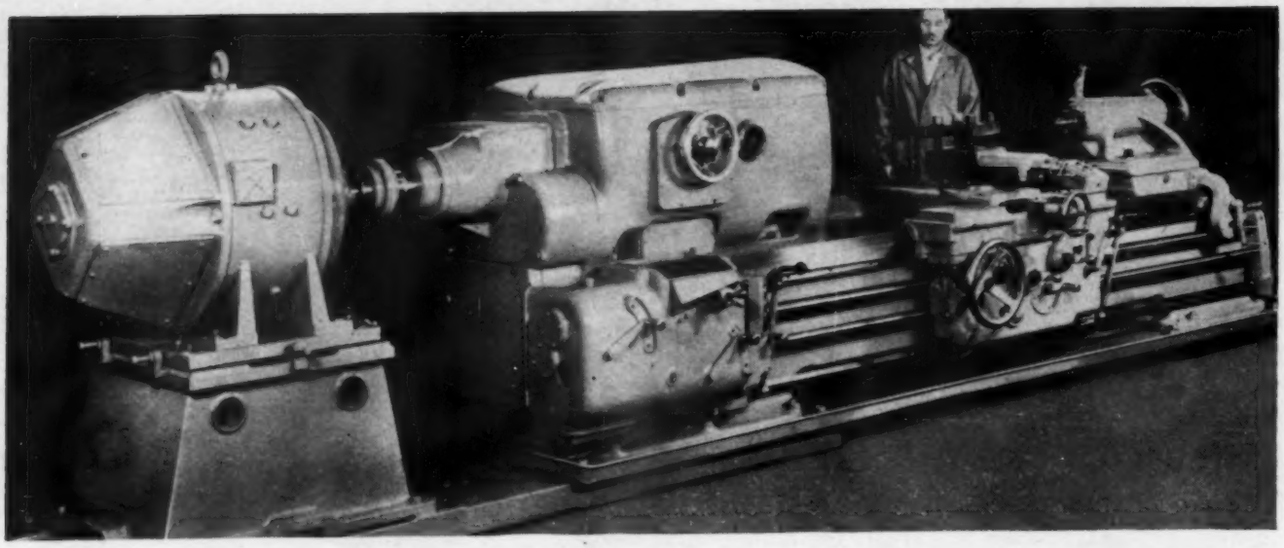


Monarch Model 150 Hogs Stock from Large Diameters

Monarch Machine Tool Co., Sidney, Ohio, announces the 32-in. Model 150 engine lathe, which is said to provide more than average swing plus sufficient power to remove stock more rapidly than previously possible. It can be used wherever stock is to be hogged from large diameter work, such as in steel mills and railroad shops.

A separately mounted motor-generator set converts ac. to the dc. required by the 50-hp., 600- to 1200-rpm. motor. Speeds of 9 to 1200 rpm. are provided. There are seven speed ranges, six of them being through back gearing.

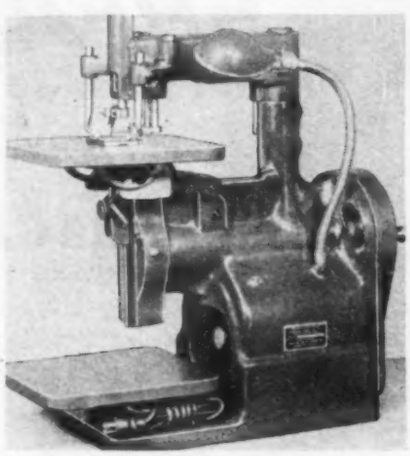
A 2:1 variation in speed can be controlled from the apron. If the diameter change of the work calls for greater speed variation, another method of shifting from one speed to another is employed. The operator selects, on a range-selector handwheel on the headstock, the speed range which includes the speed he wishes to use for a given cut. He then re-engages the apron-control lever, after which he turns a control knob, which is also mounted on the front of the headstock, until the tachometer registers the desired speed. A hydraulic mechanism does the actual work of changing the gear ratio and starting the spindle.

The 48 feeds range from 0.006 to 0.363 in., and 48 threads range from ½ to 28. The machine is available from 60 to 276 in. between centers in increments of 24 in. Net weight of the 84-in. size, including all electrical equipment, is 50,000 lb.

Govro-Nelson Model KT Tapping Unit Eliminates Clutch, Gears

Govro-Nelson Co., 1931 Antoinette St., Detroit 8, Mich., has announced the Model KT tapping unit which eliminates clutch, gears and leadscrew. Centrifugal pressure provides the feed which automatically handles any number of threads per inch. Feed is said to be sensitive enough to permit the unit to tap 0-80 and ¼-20 without adjustment.

The KT has 1725-rpm. spindle speed, maximum stroke of 1¼ in., maximum collet capacity of ¼ in., and will handle tap sizes from 00-96 to ⅜-16 depending on material. The entire mechanism operates in an oil bath sealed to retain the oil and prevent entry of coolant.



Die and Punch Making Machine Runs at 525 Strokes per Min.

The Synchronized Duplex die- and punch-making machine using needle files and saws 1/32 in. thick and up is announced by Ideal Tool and Die Co., Inc., 733-35 Congress St., Schenectady 3, N. Y. It will operate at a speed of 525 strokes per min. for fast cutting at the lighter pressures possible with needle files and saws, and at a lower speed of 325 strokes per min.

Files and saws are supported and tensioned in a fileholder within an overarm above the die table without using conventional overhanging arms or columns which might become dangerous to the operator's face when in motion. Another feature is a graduated compound-tilting table. An adjustable stroke of 0 to 1½ in. is available.

Aluminum and Dissimilar Metals Joined by All-State No. 39 Flux

A flux for joining aluminum with dissimilar ferrous and non-ferrous metals at low working temperatures has been offered by All-State Welding Alloys Co., 96 W. Post Rd., White Plains, N. Y. When this All-State No. 39 flux is used with aluminum solder, the joint is said to have the advantage of being considerably stronger than that made without the flux. It is available in paste form.

ONE important place to start reducing costs is with the machine where goods are made.

Speedier production is very definitely a function of New Departure ball bearings.

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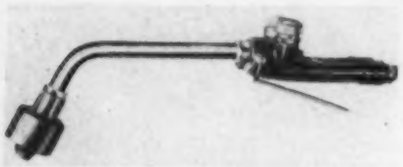
Pratt & Whitney No. 4D Die Sinker Has Power Feed, Pilot Hand Control

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn., announces the No. 4D die sinker, featuring the Directron control which permits compounding any two components of travel. The 4D produces original forging dies, die-casting dies, molds and similar work. All machine motions are power-operated, with speeds and feeds variable, but are under pilot hand control.

The Directron control is a single-lever device which, by electrical means, controls automatic continuous compound movements in any direction in either a horizontal or vertical plane.

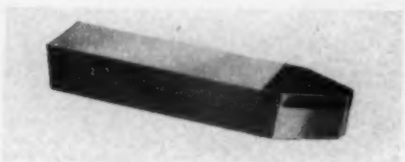
Spindle speeds are from 35 to 1750 rpm. The spindle has ball-bearing collet closer of the wrenchless type to facilitate quick cutter change. The machine operates on standard ac. voltages with the necessary dc. provided by rectifier equipment. The die sinker weighs about 10,000 lb. and is approximately 80 in. wide, 72 in. deep and 83 in. high. The unit illustrated has 16x43-in. table working surface, but can be furnished with longer table and bed.



Weldimatic Gas-Air Blowpipe Reduces Flame for Idle Period

A gas-air blowpipe designed for use with manufactured or natural gas, propane and compressed air, is announced by Weldit, Inc., 990 Oakman Blvd., Detroit, Mich. Listed as Weldimatic Model C-47, it is used for heating, annealing or soldering operations.

Made of lightweight aluminum alloy, the blowpipe automatically reduces the flame to a small pilot light during idle moments, and when work is resumed, it is said to relight instantly at the original adjustment. The lever provides for flame control regardless of position in which the blowpipe is held.



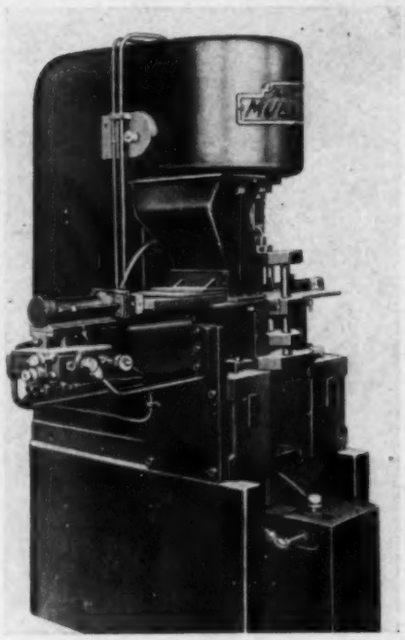
Wendt-Sonis Carbide-Tipped Tool Does Production Grooving Work

A carbide-tipped tool for production grooving has been announced by Wendt-Sonis Co., Hannibal, Mo. It is designed for machining A, B, and C belt size pulleys. The carbide tips are covered with plastic to prevent chipping from handling. Shanks are hardened and treated to prevent rusting.

The tools are manufactured in shank sizes ranging from ⅝x1 to 1 in. square. Standard tools are furnished with proper grade of carbide insert for material machined.

Dayton Rogers Overload Jack Used on Large Punch Presses

Hydraulic overload jack and connecting rod, model HJ, primarily for use on large single- and double-crank straight-side punch presses, is made by Dayton Rogers Mfg. Co., Minneapolis 7, Minn. It is said to avoid all press overloads and eliminate damage to crank and frame, and to replace the connecting rod or strap. The jack supplies a connecting link between the crank bearing and ram. It is built in sizes from 50- to 500-ton working capacity.



Denison Pelleting Multipress Processes Powdered Materials

An automatic pelleting Multipress has been introduced by Denison Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio. It will process powdered or granular forms of ceramics, chemicals, plastics or metals.

The press features independent control of charging, compacting and ejecting ram actions. All ram actions are automatic and interlocked, regardless of individual regulation. Denison's vibratory control principle is incorporated in this press, in both the die charging and the compacting rams.

Save machining time, produce accurate parts

With J&L Precision Ground Cold Finished Steel

The size accuracy and surface finish of J&L Precision Ground Cold Finished Steel is used to advantage by many manufacturers in machining parts. They find it eliminates part of the machining operation, saves tool wear and tool changes. J&L Precision Ground is available in a wide range of grades in sizes ¼" and larger from mill or your nearest J&L warehouse or distributor.

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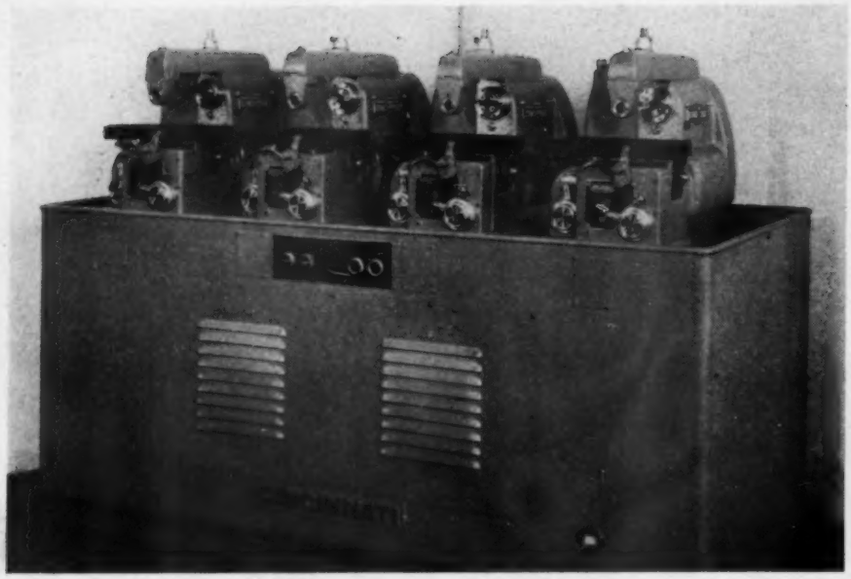


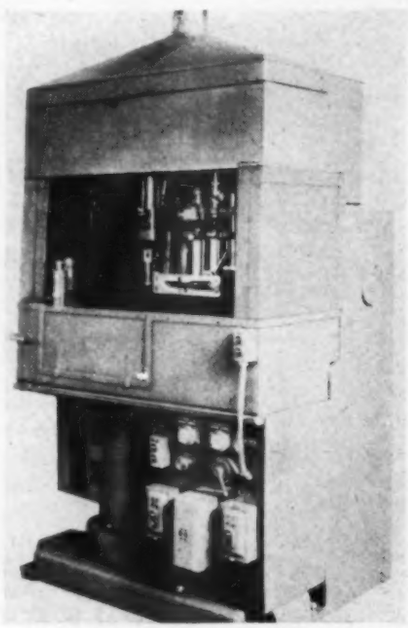
Four Individual Milling Machines Form Cincinnati's No. 000-4 Unit

The No. 000-4 Unit Type milling machine, a small production-type unit, is comprised of four individual milling machines mounted on a single base. It is made by The Cincinnati Milling Machine Co., Cincinnati, Ohio. Four separate operations can be performed progressively by the different units.

The units are completely hydraulic, having piston and cylinder table feed and balanced axial-type hydraulic motors for spindle drive. The reservoir, motor and pump, which supply the hydraulic pressure for powering the units, are mounted in the base. The individual units have 4-in. table travel, 3-in. vertical adjustment of spindle carrier, and ½-in. cross adjustment of the spindle. Standard ranges are from 1 to 40 ipm. for table speed and 500 to 1800 rpm. for spindle speed. Table rapid traverse is 200 ipm.

Feed and speed rates are said to remain constant under all conditions. Rates for each unit are selected independently of other units. Infinitely variable feeds are selected by a knob and pointer on the front of each unit. Spindle speeds are divided into two infinitely variable ranges and are selected by means of another knob and pointer on the front of each unit. One V-belt and a pair of two-step sheaves at the rear of the spindle carrier provide means of selecting desired speed range.

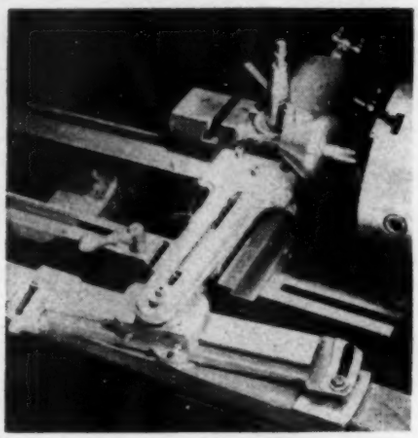
Table-operating cycles are automatic and are started by flipping a small lever at front of unit. Dog control of the cycle permits the use of intermittent feed and rapid-traverse strokes. The table feeds in either direction, and operation can be single cycle or continuous cycle as desired. Continuous cycle permits the use of magazine and hopper feeding attachments.



Chas. H. Besly Vertical-Spindle Grinder Features Feed Fixture

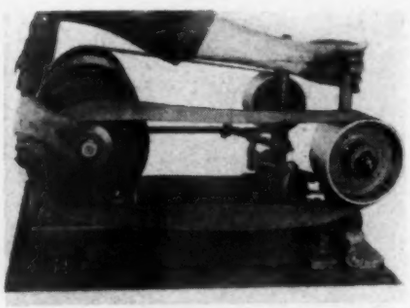
Charles H. Besly and Co., Chicago 6, Ill., has introduced a vertical-spindle full-hydraulic grinder designed for grinding faces of shears, wood chisels, scissors and cutlery. It features a feed fixture into which the rough forging is placed. The fixture then swings down into horizontal position, advances to the grinding wheel, makes the required number of passes across the wheel, and at the same time feeds down mechanically.

Work automatically recedes from the grinding wheel upon reaching a micrometer stop screw. One operator with two machines is said to be able to grind 600 surfaces per hr., or 300 complete shears.



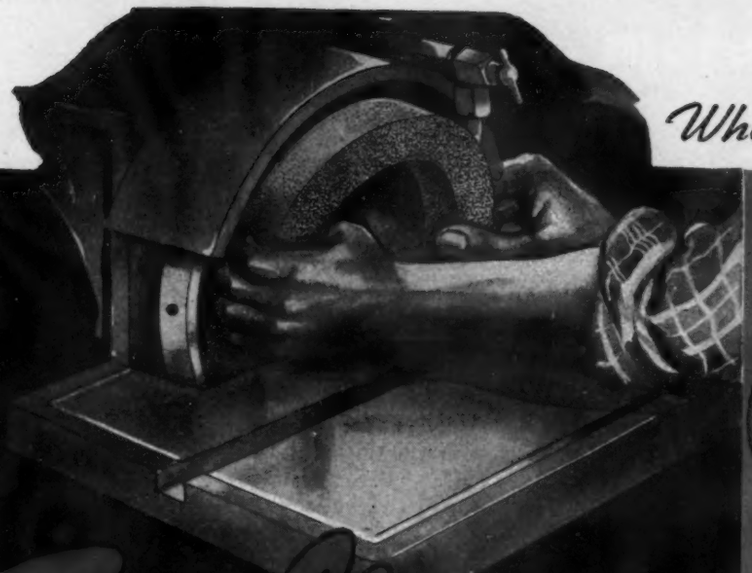
Heavy-Duty Taper Attachment Made in Two Sizes for Lathes

Master Taper Co., 126 N. Clinton St., Chicago 6, Ill., announces a heavy-duty taper attachment for lathes. It comes in two sizes, 34 and 40 in. between arms, and for V- or flat ways. Capacity: tapers up to 4 in. per ft., 20° maximum in either direction, 16-in. length at one setting. The swivel bar has V-ways graduated at one end in degrees and at the other end in inches per foot.



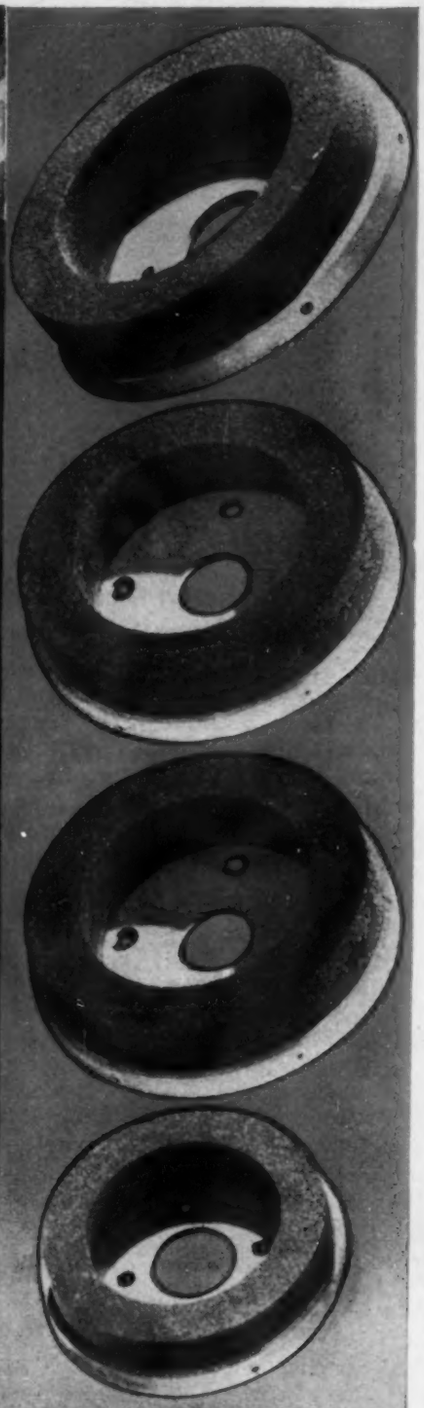
BENCH BACKSTAND, No. 52, converts existing wheel bench grinders into production abrasive-belt units. Grinding wear is on the abrasive belt rather than the contact wheel. Resilient contact wheels are said to eliminate work chatter and operator fatigue. Made by Hammond Machinery Builders, Inc., Dept. GP-30, Kalamazoo 54, Mich.

"The Wheels Of Industry"



Sterling

EASYMOUNTS



STERLING Easymounts and Wheels remove all guesswork from tungsten carbide tool grinding, together with drill and high speed tool bit sharpening. They provide a simple, removable feature for wheel replacement.

There are Easymounts for adapting to your machine, from 5" to 14" in diameter, with wheels for roughing, semi-finishing, or finishing operations.

Easymounts and Wheels are available for Willeys, Sellers, Heald, Excello, Baldor, Hammond, Oliver, Delta, Prosser, Criterion, Blount, Sundstrand, Bura-Way, and others.

There is the safety, rigidity and performance you have always desired in the Sterling Easymount and Wheel . . . write for full information. Find out how easily you can enjoy this economy!

Send for the Easymount Folder!

A COMPLETE description of the Sterling Easymount and Wheel is contained in this attractive, two-color folder, recently released. Lists and describes all sizes and gives prices. Ask for your copy; it will be sent at once!

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THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
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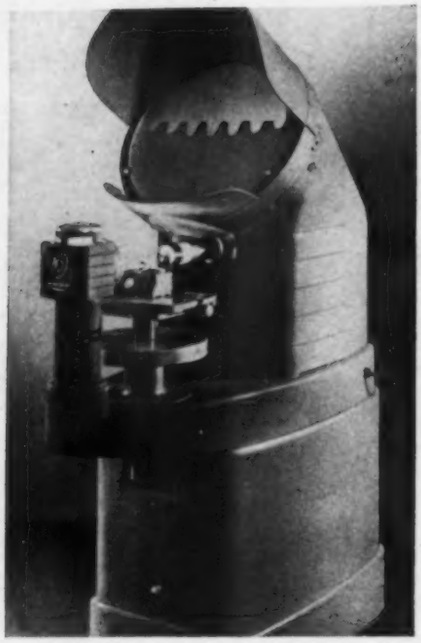
THE WHEELS OF INDUSTRY



Optical Projection Comparator Made for Inspection, Measuring

An optical projection comparator, developed by American Optical Co., is being distributed by Engineers Specialties Div., Universal Engraving & Colorplate Co., Inc., Buffalo 8, N. Y.

The unit is placed either on a bench or on its own pedestal, and can be used for inspection of production pieces or, by the addition of a micrometer stage and protractor, as a microscopically precise measuring device.

Parfocal and parmagnified lens systems are factory adjusted for correct magnification and focus. The unit includes a forced down-draft lamp cooling system to prevent heat from hitting operator's face. The unit features interchangeable magnifications of 10, 20, 31.25 and 62.5× in bayonet mounts. The screen has 16-in. dia. image area.

Federal's Punch-Press Spacers Compensate Stripper-Bolt Height

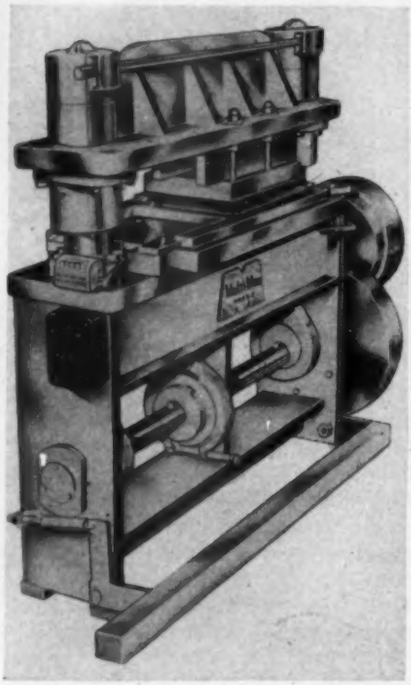
Stripper-bolt compensator spacers, manufactured by Federal Tool & Mfg. Co., 3212 N. Washington Ave., Minneapolis, Minn., eliminate the necessity of counter-boring stripper plates or shortening the stripper bolts when a punch is ground to the extent that the stripper plate is too high. A spacer of proper thickness is merely inserted under the head of the stripper bolts.

The spacers are available in boxes of 250. They are nickel plated and come in all sizes.

Speer ACWeld Carbon Electrode Gives Wide Flame for Welding

ACWeld carbon electrodes, developed for use with ac. welding equipment, have been announced by Speer Carbon Co., St. Marys, Pa. Set at the proper amperage, the carbons are said to give a wide flame useful in brazing copper and brass tubing, in bending, forming and heat treating, soldering and welding.

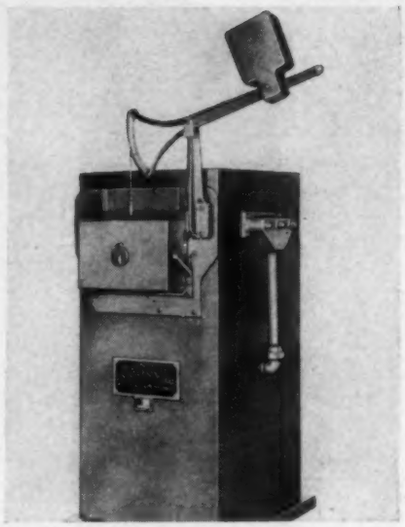
The carbons are also said to be advantageous for work requiring applications of heat by radiation, as the radiant heat (9000 F.) of the carbon flame increases the scope of electric welding.



Parker 30-Ton Multi-Max Press Can Give 100 Strokes per Min.

A 30-ton combination shear and press known as the Multi-Max has been introduced by Parker Mfg. Co., 2200 Colorado Ave., Santa Monica, Calif. It shears, blanks, notches, punches, perforates, slots, pierces, lances, bends and forms sheet-metal parts in single or multiple units. One operator is needed.

The machine requires 36x75-in. floor space and is easily moved. Finished parts are fabricated at the point of assembly. A 1½-hp., 3-phase motor is furnished, capable of producing 100 strokes per min. The stroke is 2 in., as is ram adjustment. Bed die space is 12x36 in., while ram die space is 10x36 in. Shut height of the unit is 10 in.



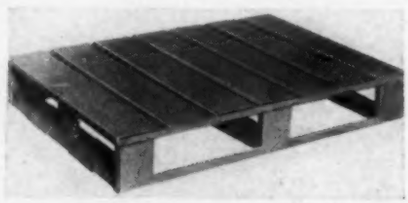
Eclipse No. 814-16 Oven Furnace Comes in Two Temperature Ranges

Gas-fired Oven Furnace No. 814-16, offered in two temperature ranges, 1400 to 1800 and 2000 to 2500 F., can be used for heat-treating carbon tool steel, alloy steel and high-speed steel. Made by Eclipse Fuel Engineering Co., 764 S. Main St., Rockford, Ill., the unit is fully enclosed with a hearth supplied in either silicon carbide or firebrick.

Hydro-Buff 500-Series Compounds Cut and Color in Same Operation

Hydro-Buff 500 series of buffing compounds is claimed to reduce cleaning time. Made by Hydro Chemical Co., 24 Clark St., East Hartford, Conn., the compounds are non-flammable and are soluble in all proportions in the chlorinated hydrocarbons.

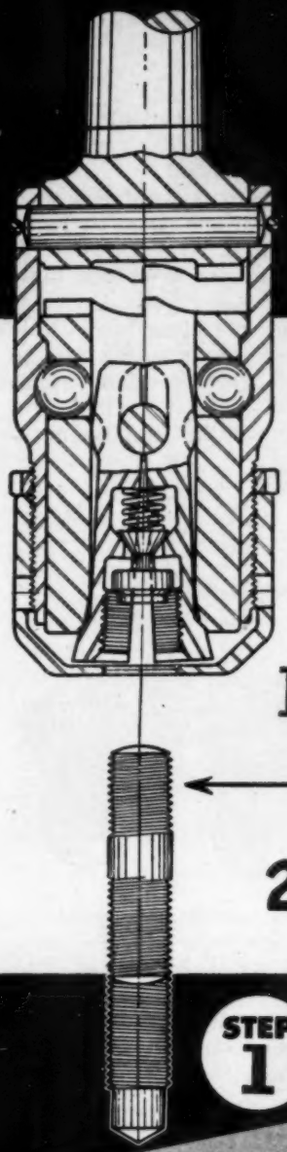
The series will cut and color in the same operation, eliminating the need for rouge. Film remaining on the piece, before cleaning, will protect against oxidation and staining.



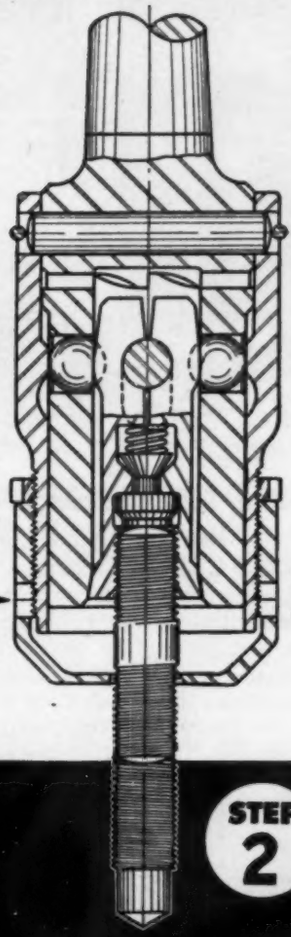
FOUR-WAY PALLET made by Palmer-Shile Co., 16019 Fullerton Ave., Detroit 27, Mich., is single-faced, and constructed of welded, corrugated, rolled steel. Designed for use with power lift and hand trucks, it is built to meet specific requirements or specifications

Three MODERN steps to faster, more economical stud setting

MODERN SELF-OPENING STUD SETTER

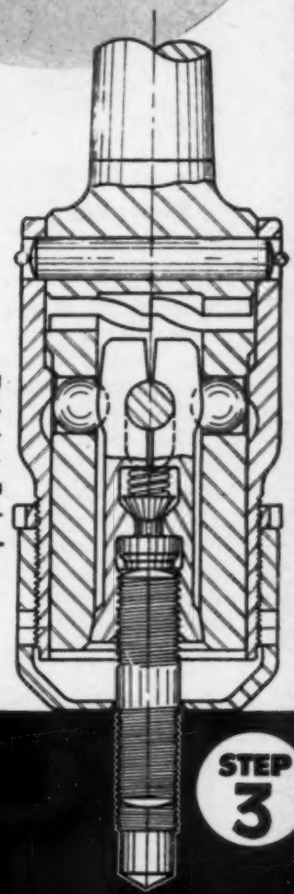


1 Tool in position over stud ready to start drive. Jaws open to take stud.



2 Start of the drive with tool engaged on stud. Jaws locked.

3 Drive completed. Stud driven to full depth. The stop collar contacts the work releasing the clutch. Lifting the tool opens the jaws.



STEP 1

STEP 2

STEP 3

This tool does the job in a single continuous operation. It sets the stud, then opens automatically. No reversal. No backing off the stud.

Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

As the action of this tool is positive and automatic, it is conveniently operated in any position with either air or electrically operated portable tools. It is also adapted to use in a drill press where it is possible to drill and tap the holes and set studs in successive operations.

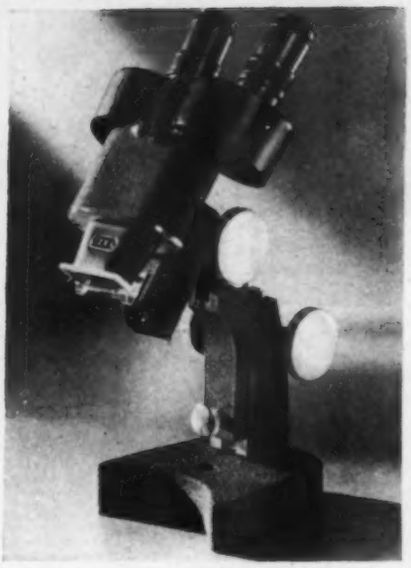
For full information, send for Bulletin M-186

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

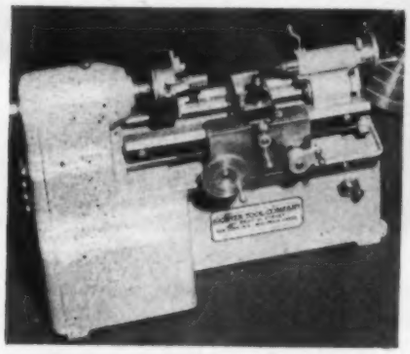
ROCHESTER 10, NEW YORK



Spencer Stereoscopic Microscope Shows Work in Upright Position

Spencer stereoscopic microscope, announced by American Optical Co., Southbridge, Mass., is useful in injection jet drilling, precision grinding, hand broaching, and other toolmaking, fabricating and inspection processes.

The microscope provides both stereoscopic vision and magnification of minute parts, and is adjustable. The optical system with converging objectives, achromatically corrected, shows length, width and depth. The design allows the operator to wear safety goggles. The microscope is supplied in powers of 9, 18, and 27×. Cabinets are supplied.



ManSon Metal-Turning Lathe Can Be Carried in Pocket

The ManSon metal-turning lathe, designed for small, precision work, is made by Small Machines, Inc. and distributed by Richter Tool Co., 141 West 41st St., New York, N. Y. Size is 9 3/16 in. long, 3 11/16 in. wide, and 6¾ in. high. There are 3 in. between centers and swing over carriage of ¾ in. The spindle has a 3/16-in. hole through which bar stock up to ⅛-in. dia. can be fed. The machine is powered by a 110-v. ac. induction motor. The carriage is provided with handwheel control as well as automatic power feed.

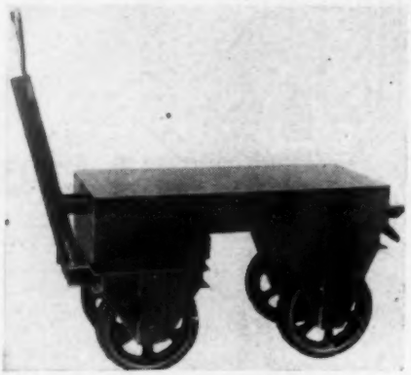
The lathe is constructed of steel, cast iron and aluminum alloy parts. Shipping weight is 12 lb.

Denison Self-Contained Table Has Six Indexing Stations

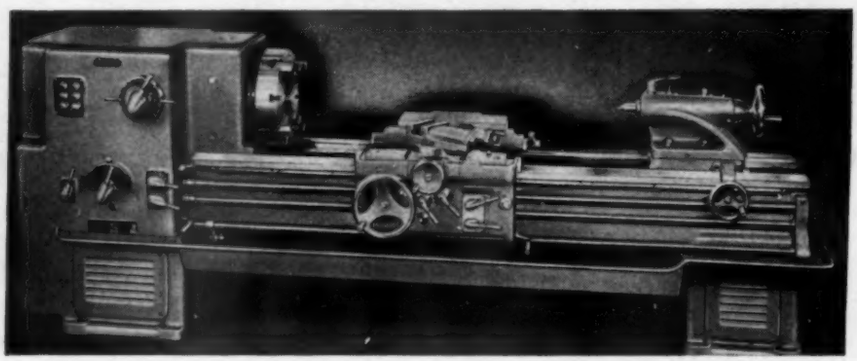
A self-contained six-station hydraulic index table designed for use with the Multipress or Multi-Unit press, has been announced by The Denison Engineering Co., 1160 Dublin Rd. Columbus 16, Ohio. This table can be used with any equipment where hydraulic power is available. It operates directly off the hydraulic system of the press itself.

The fluid motor is equipped with speed control, permitting 10 to 70 indexes per min. When used with the Multipress, action of the table and press is automatic.

A skip-station feature is available which permits the pressing ram to skip any number of specified stations around the dial. The index table will not rotate until the ram has completed its cycle.



HEAVY-DUTY TRUCK designed for shops where continual moving of heavy dies, jigs or fixtures is necessary. Announced by Palmer-Shile Co., 16019 Fullerton Ave., Detroit 27, Mich. Roller conveyors can be used on bed of truck to facilitate material handling



Sidney Herringbone-Geared Lathe Equipped with 32 Spindle Speeds

An 18-in. engine lathe, manufactured by The Sidney Machine Tool Co., Sidney, Ohio, is equipped with an all-herringbone-geared headstock with 32 pre-selective spindle speeds. The spindle and intermediate shafts are supported by anti-friction center bearings as well as the regular end-bearing mounting.

Standard spindle bore is 1 13/16 in. and can be increased to 3¾ in. A standard speed range of from 13 to 1000 rpm. or an optional high range from 10 to 1500 rpm. is available.

The gear box is totally enclosed with all moving parts running in oil. 60 changes of feeds from 0.0028 to 0.174 and 60 changes of threads from 1½ to 92 are obtainable from a dial control. Lubrication is automatic.

CRACK DOWN ON COSTS

with the high-production flexibility of the Delta* 17" Drill Press

Versatile Delta Drill Presses give you low-cost, trouble-free capacity for a wide variety of operations and set-ups

You can use a low-cost Delta 17" Drill Press (single or multiple spindles) in dozens of operations in almost any plant. And wherever you use a Delta, *you can count on increased production—at lower costs!* That has been the experience of The Dumore Company, Racine, Wisconsin, manufacturer of precision tools and grinders—and it has been the experience of hundreds of other plants as well.

At Dumore, nearly 100 Delta Drill Presses are used for drilling, tapping, burring, spot-facing, and a variety of other jobs. Dumore's ingenious Delta set-ups suggest ways *you can streamline your plant operations for lower costs.*

The Delta 17" Drill Press is engineered for accurate, fast production, and long, dependable service. Outstanding design and construction features give you exceptional value: Extremely accurate spindle with an exceptionally long bearing surface of spline to eliminate wear and retain original accuracy . . . pulley mounted on lubricated-for-life ball bearings . . . head- and table-raising mechanisms equipped with ball bearings . . . close-tolerance table surfaces . . . heavy construction throughout, with advanced design for correct weight distribution.

Send for a free copy of Bulletin A-17 today. Use the coupon below. Or ask your Delta distributor for further details on Delta 17" Drill Presses. Your distributor is listed under "Tools" in the classified section of your telephone directory. Look him up.

Delta 17" Drill Press — available as single-spindle floor or bench-type, or 2, 3, 4, 5, 6 and 8-spindle press, with one-piece or sectional tables.

Capacity: ¾" in cast iron.

Machines include: table-raising mechanism, streamlined belt-guard, built-in depth gage, depth scale on spindle return spring housing.

Spindle: No. 2 Morse Taper Spindle, or ½" Jacobs Chuck Spindle.

Motor: Choice of ½, ¾, or 1 HP for light, medium, or heavy-duty work.

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
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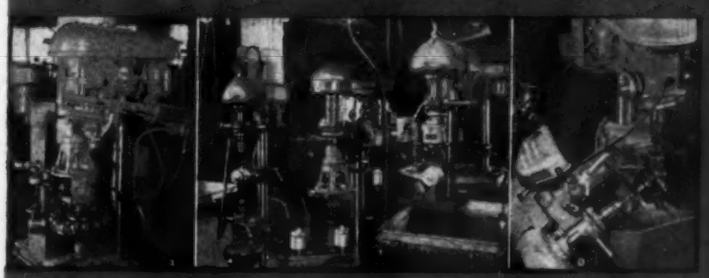
▼ *Other Cost-Cutting Delta Machine Tools*

Trade Mark Reg. U. S. Pat. Off.

Dumore increased production on bearing-cap wrench holes 500% with this Delta Drill Press and special-pneumatic rotary-table fixture.

This Delta 17" Drill Press, equipped with Multi-Drill Head and pneumatic feed, increased production 300% in drilling 6 vent-holes in motor housing.

These two Delta Drill Presses (mounted on the same stand) increased production 400% on this drilling and spot-facing job on a motor case.



TEAR OUT THIS COUPON AND MAIL TODAY!

DELTA MANUFACTURING DIVISION
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Please send me Bulletin No. A-17 on Delta 17" Drill Presses.

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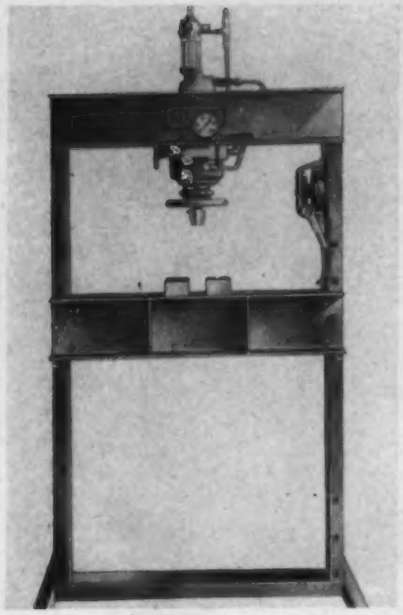


Dake's Air-Operated Presses Available in Three Capacities

An air-operated press series available in 25, 50 and 75-ton capacities has been announced by Dake Engine Co., Grand Haven, Mich. The presses can be used wherever an air supply is available. They come with either of two style pumps. One style provides rated tonnage of the press at 145-lb. air pressure; the other at 90-lb. air pressure. The press is equipped with a special safety valve to prevent overloading of equipment regardless of the air pressure that is supplied.

SOLID-CARBIDE center-lapping tool, developed by Raymac Mfg. Co., Inc., 3729 Cass Ave., Detroit 1, Mich., is available in standard sizes of $\frac{1}{2}$x$1\frac{1}{2}$ in. and $\frac{3}{8}$x$1\frac{1}{2}$ in., 60° included angle. Designed to replace abrasives, it can be used in standard center-lapping machines or drillpresses in working metal up to 62 to 65 C Rockwell

Hobart No. 12 Coated Electrode Designed for Poor Fit-Up Work

Hobart No. 12 electrode has been designed to increase welding speed on poor fit-up work. It is announced by Hobart Brothers Co., Troy, Ohio. Heavily coated, the electrode is designed for dc. straight polarity or ac., at higher current ratings to increase speed. Spatter loss is said to be low, and the electrode is said to have less tendency to stick when welding with a close arc. It is available in five diameters from 3/32 to ¼ inch.

Ansaldi Automatic Disintegrator Removes Drills with Electrode

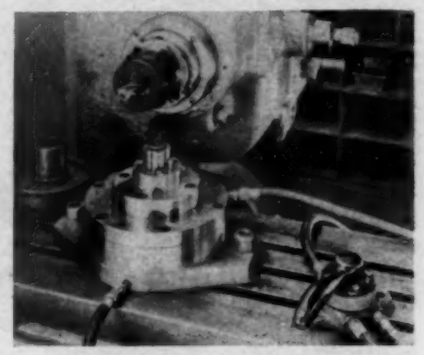
An automatic disintegrator for removing taps, drills, studs, and reamers from die sections, castings, hardened steel, and most alloys without distorting the part is announced by Ansaldi Tool & Engineering Co., 4744 Twelfth St., Detroit 8, Mich.

The obstructions are removed by the use of electrodes which are available several feet in length for deep holes. The disintegrator has a revolving head which can be swiveled to any angle or compound angle. It can be used horizontally, upside-down, to a height of 7 ft., or close to the floor. The control panel is equipped with voltmeter, control knobs and water valves.

Sander and Accessories Housed In Steel Case Made by Sterling

A gray gloss-finished steel-carrying case enabling user to have available in one case all of the accessories and materials necessary to do complete sanding and finishing with the Sterling 1000 portable electric sander is announced by the Sterling Tool Products Co., Chicago, Ill.

The case is divided into three compartments. Included are two extra sanding pads, a sponge rubber pad, lubricating oil, bearing grease, two cartons of dust filters, and an extra brush and spring assembly.



WORK-HOLDING air-operated fixture incorporating Erickson precision faceplate mandrel is made by the Erickson Tools Div., 2309 Hamilton Ave., Cleveland 14, Ohio. Developed as an addition to the precision chuck mounted on a milling machine, the fixture is fitted with special locators for positioning work. It can take three additional sizes of mandrels

Detroit Stampings' Plunger Clamp Exerts 2500-lb. Normal Pressure

"The Ram," an extra-heavy-duty plunger clamp, is announced by Detroit Stamping Co., Dept. K, 343 Midland Ave., Detroit 3, Mich. Listed as Model 640, it is capable of exerting over 2500-lb. normal pressure. The handle is down when the clamp is closed.

The clamp is adaptable to such conversions as light arbor, punch and forming presses and for heavy-duty clamping in milling, drilling, welding and similar operations. It is 15¾ in. over-all, and 3¼ in. high when closed. The pressure may be adjusted by turning the bolt in the tapped end.

"Prevents costly interruptions of progressive assembly"

...says MACK Mfg. Corp.

Digest of James O. Peck Co. report, another of the independent studies of assembly savings made with Phillips Recessed Head Screws in leading plants.

Power drivers are "puncture-proof" despite the thin, sheet aluminum panels, because of the "engineered fit" of the Phillips Driver Bit in the Phillips Recess. No skids! No burred heads!

"Trim" is the word for the way the Phillips Recessed Heads dress up the modern bus interior. But the advantage is more than just appearance: idle-handed passengers are discouraged from attempts to loosen screws.

"Our engineering department specified Phillips Recessed Head Screws on both trucks and busses," explained the technical assistant to Mack's general superintendent. "Since we are turning out 1750 trucks and 200 busses a month, and each unit requires thousands of Phillips Screws, there are good reasons for this specification.

"STOP DRIVER SKIDS THAT STOPPED THE ASSEMBLY LINE. Phillips Screws ended the scratching and puncturing of aluminum panels by drivers skidding out of slotted screw heads. We save the time and labor of interrupting our progressive assembly to remove and replace panels. That was the big cost — many times the cost of the damaged panels themselves — and that's just one way Phillips Screws save us money.

"BETTER DRIVER CONTROL. The positive fit of the driver in the Phillips Recess makes it practicable for us to use air power tools and speed driving. Even when driving at an angle, we avoid slips. And, with a spiral driver, the operator is able to tighten a screw by 'feel' without danger of chewing up the head.

"CONTRIBUTES TO DESIGN OF BUS INTERIORS. Particularly when large screws are used, the Phillips Recessed Head adds ornamental design to the interior, while slotted heads, with the slots pointing every which way, detract from the trim appearance we aim for. Furthermore, it discourages passengers from attempting to loosen Phillips Screws as they often do slotted screws, with snagged clothing a result."

FOR IDEAS USEFUL IN YOUR ASSEMBLY, get this study of Mack Mfg. Corp. methods, and other assembly reports covering metal, wood, and plastic products. Mail this coupon NOW!

PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

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Send me reports on Assembly Savings with Phillips Screws.

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Company.....

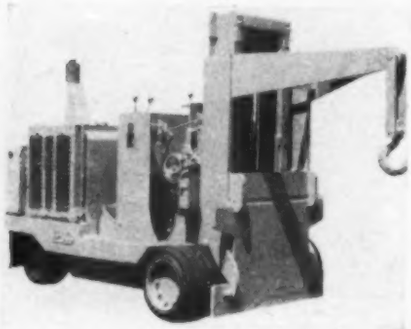
Address..... AM-23

Alloy Pistons Reconditioned By Wilkening's Thermo-sizer

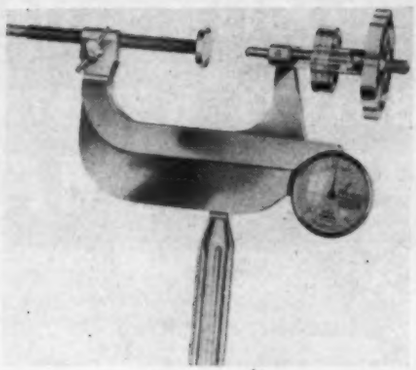
The Thermo-sizer, used to reshape and resize alloy pistons to fit the cylinders in which they operate, has been announced by the Wilkening Mfg. Co., Philadelphia 42, Pa. By this process the pistons are also cleaned of carbon, gum and sludge.

The machine utilizes heat-shaping in the reconditioning process, resizing and reshaping as much as 0.030 in. Piston skirts can be expanded more across top than bottom, enabling the piston to fit into tapered cylinders.

Fifteen to 20 sets of pistons are said to be able to be handled per day. The heated piston is placed over two adjustable fingers which are then moved apart by turning a wheel, stretching the skirt as needed. A dial gage measures the expansion as it occurs. An abrasive disk is provided for dressing up each piston after Thermo-sizing.



BOOM-AND-HOOK attachment can be used in foundries, automotive plants and other heavy industries. Announced by Yale and Towne Mfg. Co., Philadelphia, Pa., the hook has an outreach of approx. 4 ft. and can lift loads to 18,000 lb.

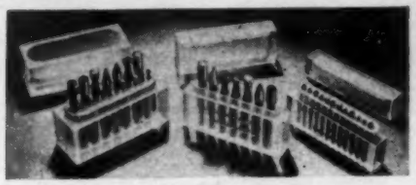


Model 4 Ames Hardness Tester Gives Direct Rockwell Reading

A 4-in. capacity portable hardness tester has been announced by Ames Precision Machine Works, Waltham 54, Mass. Listed as Model 4, the tester weighs slightly over 3 lb. and reads directly in the Rockwell hardness scales.

The frame is shaped like that of an ordinary 4-in. micrometer. A diamond penetrator is used for testing hardened steel, and ball penetrators for testing soft materials, as specified in the Rockwell chart.

The indicator dial has graduations showing when pressures of 60, 100, and 150 kg. are applied by turning the handwheel. Rockwell readings are taken from the graduated barrel dial located beneath a Lucite magnifier and adjusted to accommodate different sizes of work.

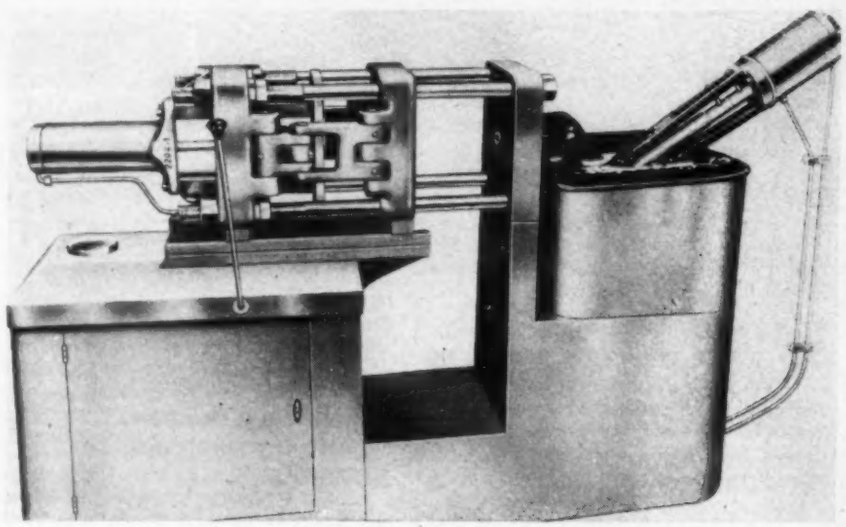


Lincoln Park's Carbur Sets Replace Steel Rotary Files

Lincoln Park Industries, Inc. 1719 Ferris Ave., Lincoln Park 25, Mich., announces the addition of two sets of Carburs. Each set is contained in a plastic case.

One set is comprised of seven different tools of ¼-in. head dia. with shanks of ¼-in. dia. and 1¾ in. long. The other combines the seven ¼-in. dia. tools with the standard set of 11 Midget Carburs which have ⅛-in. head dia., 1⅛-in. over-all length, and ⅛-in. dia. shank.

These tools are used to replace steel rotary files and small mounted grinding wheels, and are made of solid cemented-carbide. They are said to cut practically any material including hardened steel.



Hydraulic Hot-Chamber Machine Operated by Single Lever Control

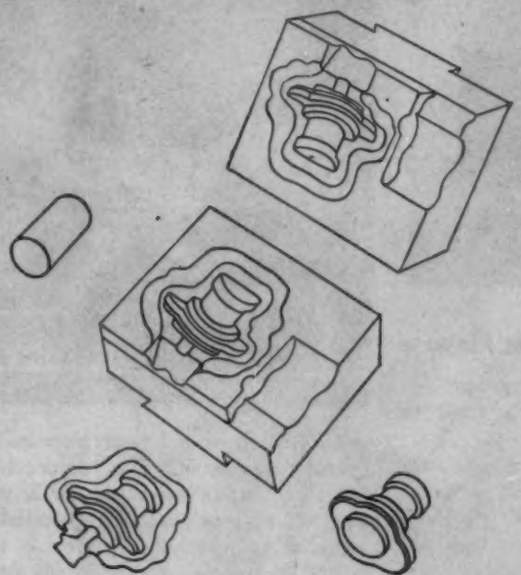
A hydraulic hot-chamber machine embodies cold-chamber injection pressure for a 2-lb. shot, either center gated or 3 in. below. Manufactured by the Production Engineering Consultants, Los Angeles 16, Calif., it is 10x10 in. between the bars and will take die thicknesses from 6 to 11 in. with die halves separating 6 in.

The unit cannot be shot when the dies are open. Casting operation is by single lever control. When moved forward it closes the die and shoots, and when returned, it opens the machine to eject the casting. The 300-lb. pot has 500 lb. per hr. melting capacity. High platen center line of 38 in. reduces operator fatigue.

Want Tighter Control Over Parts Cost?...

A BULLETIN SERVICE

for users of forgings, entitled "Advantages Obtained by Utilizing Champion Forging Techniques", gives complete information about cost reductions and quality control achieved by forging specific parts in closed impression dies.



...Investigate Forgings...

Close Tolerance Forgings Produced by

Champion

FORGING TECHNIQUES

● Begin by taking specific parts—cast parts, stamped parts, machined-from-bar-stock parts, forged parts. Analyze them with the aid of a Champion Forging Techniques Engineer who, because of many years of forging production experience, may help you to discover opportunities, heretofore unappreciated or overlooked, to obtain and maintain tighter control over end-use cost. In some cases, tighter control may involve conversion from another method of fabrication to forging the part. When such an opportunity is revealed, tighter control usually begins at the drafting board stage. In other cases, tighter control over parts cost may begin at the buying stage, or at the machining and finishing stage. A Champion Forging Techniques Engineer frequently identifies, through analysis of the design of a part and the method of fabricating it, cost reductions of major importance. Ask him for suggestions on how to exercise tighter control over parts cost.

THE CHAMPION MACHINE & FORGING COMPANY

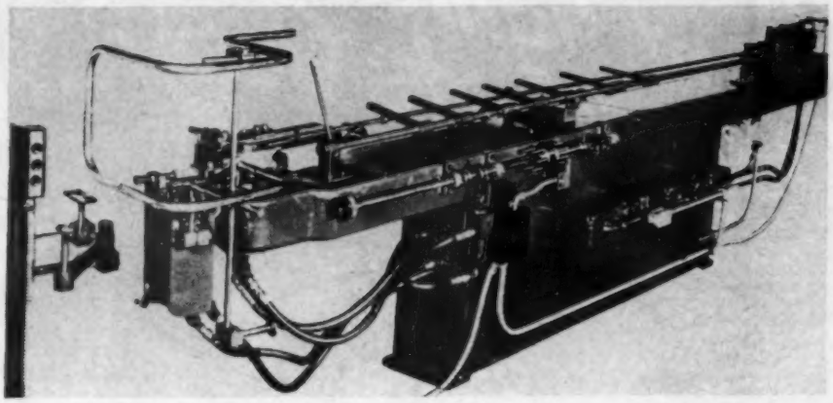
3699 EAST 78th ST. • CLEVELAND 5, OHIO

DROP AND UPSET FORGINGS, CARBON AND ALLOY STEELS • HEAT TREATING • LABORATORY AND QUALITY CONTROL

"Axial Face Kennamill" Performs Production Milling of Cast Iron

Kennametal Inc., Latrobe, Pa., announces its "Axial Face Kennamill" designed for production milling of cast iron, and suitable for light to medium cuts on solid or cored castings.

The cutter can be mounted on all common spindles with bolt circle provided to order. The body is shaped to permit grinding at 45° corner angle. Blades can be assembled to within a few thousandths on face and periphery, and are said not to move during tightening. Five sizes are now available: 6, 8, 10, 12, and 14 in.

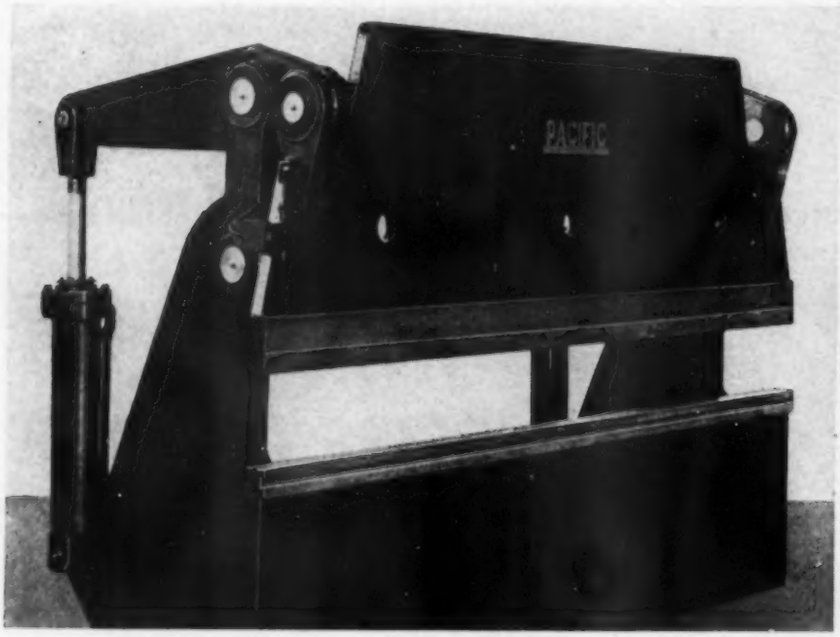


Pines Improved Bending Machine Designed for Pipes, Bars, Tubes

Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill., announces improvements in its line of bending machines. They are designed for bending pipes, bars, tubes, and extruded shapes. The range of standard machine sizes will handle to 6-in. extra-heavy pipe.

Finger-tip control and built-in adjustments permit single duplication of a series of various bends on each piece. Pressing a button starts a cycle which: activates a clamp against work; engages pressure die which feeds with work into bending die; rotates bending arm to required angle; extracts mandrel (if employed); opens clamp; releases pressure die; returns arm; advances mandrel to work; indexes to next bend angle.

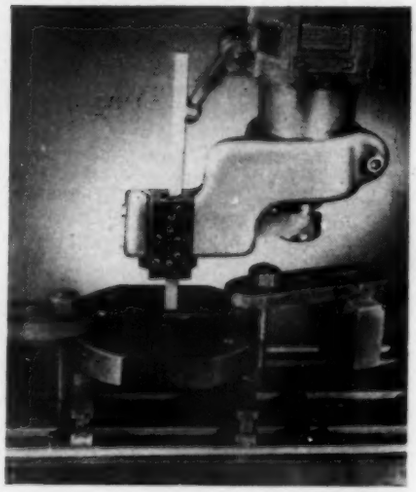
The roller-type pressure die feeds with and provides a back support for the work. Thus scratching of polished stock is said to be eliminated. Adjustment of the clamp and pressure dies can be made to micrometer limits. A degree-of-bend selector is available for quantity production of two or more bends of different angularity. Adjustable plane-of-bend stops have been developed for controlling each bend in relation to others.



Pacific Industrial Press Brake Forms Sheet Metal and Light Plate

Hydraulic press brake, Model 150, for sheet-metal and light-plate forming operations has been announced by Pacific Industrial Mfg. Co., 848 49th Ave., Oakland, Calif. It can handle up to ¼ in. by 10 ft. Overall die surface length is 12 ft.; throat depth on standard models is 8 in. Maximum pressure is obtainable at any position in stroke, and the ram can be stopped and either returned or re-started with full pressure at any point. A footswitch is used to control ram movement.

Automatic controls maintain ram at level or any desired tilt position within 0.0025 in. Vernier-type gage stops and micro-switch controls are used for adjusting length of stroke. The press can be used for all types of press-brake bending, forming, punching and blanking work.



WILL-WOOD attachment permits the use of ordinary mill files for precision filing with index machines and Bridgeport milling machines. It is installed on machine spindle. Filing speed is controlled by spindle speed. The file stroke travels only ½ in., reducing wear. Made by W & W Tool & Die, Inc., Midland, Mich.

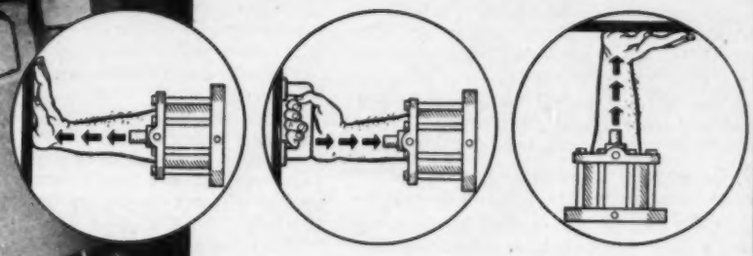
SAVE LABOR

with

T-J CYLINDERS

★ SIMPLIFY MACHINES
★ SAVE OPERATIONS
★ DO PUSH-PULL-LIFT JOBS

Automatically!



More and more today—industry is *saving labor* by applying T-J Air and Hydraulic Cylinders to operations of all kinds where pushing, pulling, lifting or mechanical control is needed. Available in many standard sizes and styles... 100 lb. or 50,000 lb.... both cushioned and non-cushioned types. Backed by 30 years of know-how...T-J engineered to do the job *better* and *cut costs!* Write today for catalogs.

The Tomkins-Johnson Company, Jackson, Mich.

FOR TOUGH JOBS SPECIFY

T-J

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RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

YES, you can save up to 20% on a brand new set of Ellstrom Chromium-plated Gage Blocks simply by trading in your worn set under Ellstrom's liberal exchange plan. Here's how it works . . .

(1) If you have a used set of rectangular Ellstrom blocks, you get a 20% trade-in allowance on a brand new duplicate set.

(2) On worn rectangular blocks of any other make, you get a 10% trade-in allowance.

(3) Used sets of square type blocks bring you a 10% trade-in allowance regardless of make.

(4) Or, if you have any number of individual blocks in need of replacement, the same discounts will be allowed on the price of replacement.

NOTE: All discounts are based on existing W prices.

Under this liberal exchange plan, you can keep your old blocks until we deliver your new ones—each having the inimitable Ellstrom feature of Chromium plated gaging surfaces to assure you of longer wearing millionths!

Write today for latest Ellstrom prices and delivery schedules.

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Originators of Chromium Plated Gage Blocks

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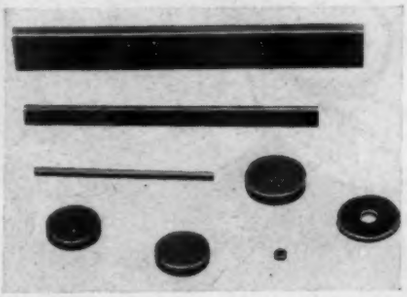
MEASURING IN MILLIONTHS FOR 3 GENERATIONS

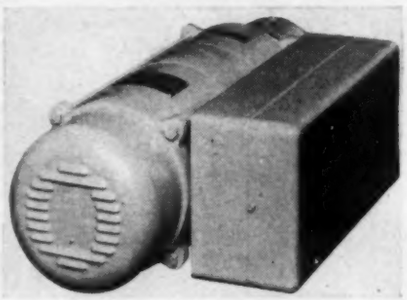
Make use of our dependable inspection service.

Parts and Materials



Carbide Disks, Solid Strips Made Available by Carboloy

Three cemented-carbide products—solid disks, disks with holes, and solid strips have been made available by Carboloy Co., Inc., Detroit 32, Mich. The solid disks are furnished in 10 sizes ranging from ⅛- to 1-in. dia. There are 12 sizes of the disks with holes, and 21 sizes of the solid-carbide strips.



GE's Electronic Amplidyne Maintains Constant Speeds

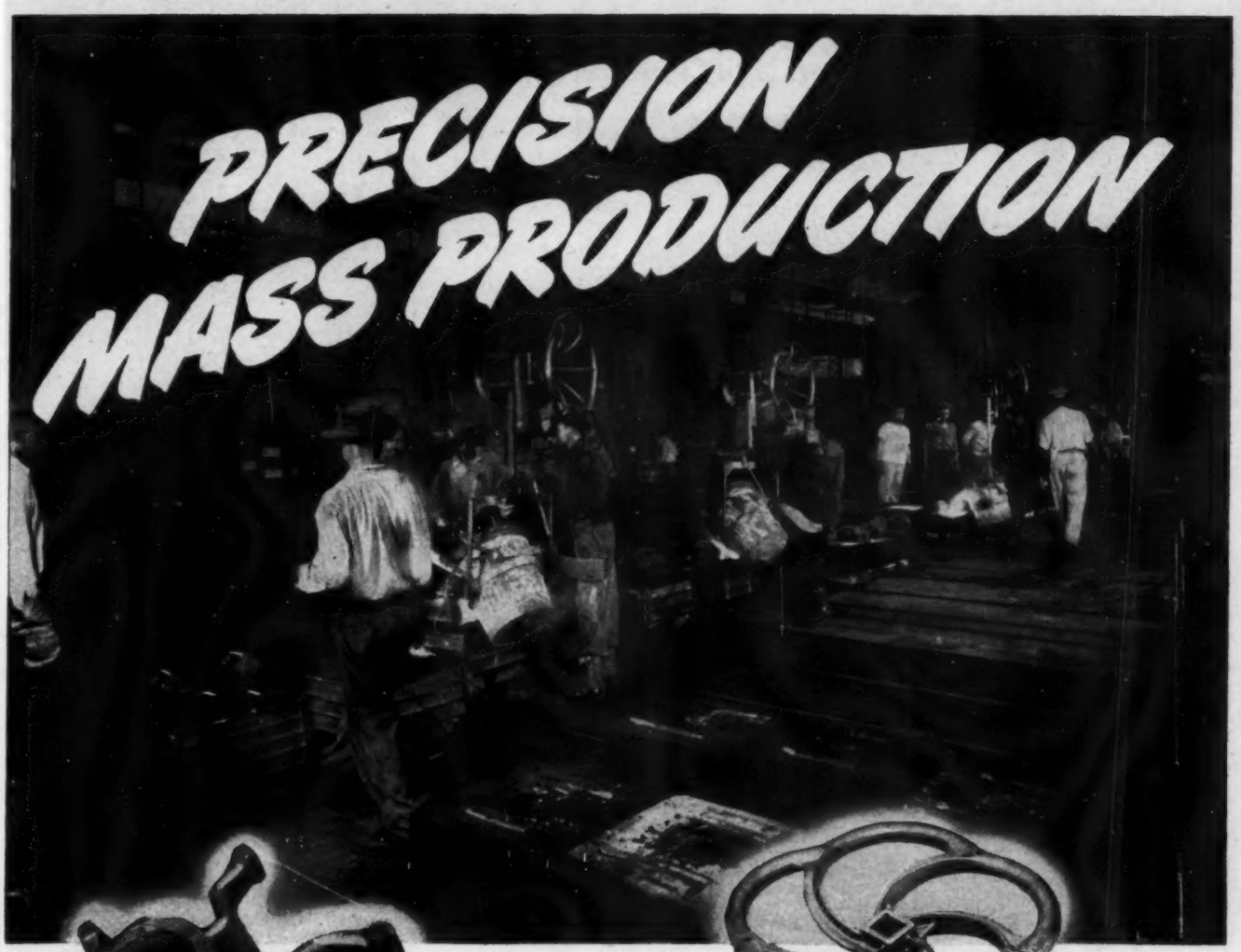
An electronic amplidyne consisting of a high-gain balanced dc. electronic amplifier and a motor amplidyne has been announced by General Electric Co., Schenectady 5, N. Y. The equipment is useful for precise regulation of current, voltage, and speed.

Designed for use as a regulated adjustable-voltage power supply for dc. motor to 1½ hp. and as a regulated exciter for larger adjustable-voltage drives to 200 hp., the equipment has an output of 1½ kw., 250 v.

A speed range of 20:1 or greater is available. The electronic amplidyne is said to reduce starting shock on the driven machine by means of current limit control of acceleration and stalled current.

The equipment maintains speed on

PRECISION MASS PRODUCTION



. . . meets "TRANSPORTATION'S" demands!

Day in and day out, Unitcast's precision mass production is solving transportation's complex castings problems.

With transportation castings, dependability is foremost. On trucks, trailers, busses and railroads, dependable castings of the highest quality and uniformity must be delivered—and are being delivered by Unitcast—to meet the toughest specifications.

Accurately made molds from technically controlled sand mixtures afford the right collapsibility that prevents tears and distortion. Down thru the entire production line, automatic accuracy is prevalent — on guard against defects in the finished castings.

Consult with Unitcast's trained engineers regarding your particular steel casting problems.

Unitcast Corporation,
Toledo 9, Ohio.

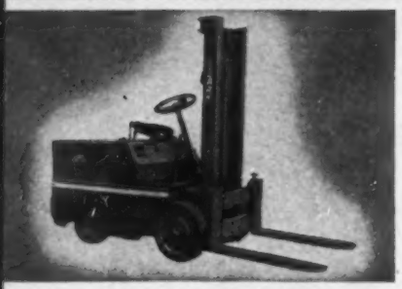
UNITCAST CORPORATION

ALLOY AND CARBON ELECTRIC STEEL CASTINGS

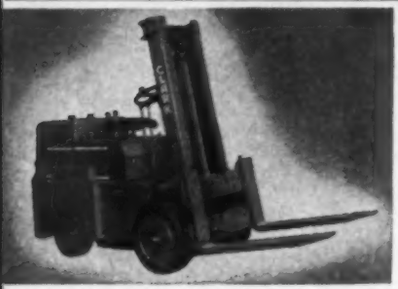
Cut Cost Factors with Clark Tructractors

The New CLARKAT

The Famed CLARKTOR 6



Electric FORK TRUCK



Gas Powered FORK TRUCK

ABOVE EVERYTHING ELSE . . . in the material handling field, Clark Methods and Clark Machines are outstanding, permitting maximum savings in man hours and handling costs. The full story in pictures—"Material Handling News"—is yours for the asking.

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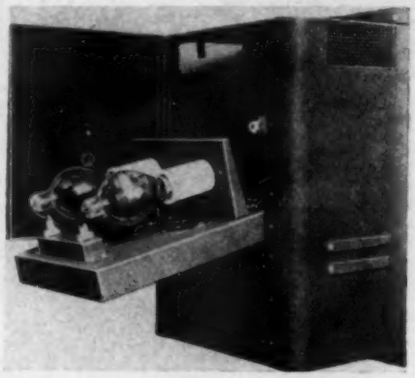
Division of CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN
OTHER PLANTS – BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK Products

FORK LIFT TRUCKS		ELECTRIC STEEL CASTINGS
TOWING, DUMP AND	DRILLS	METAL SPOKE WHEELS
SHOVEL TRACTORS	& GEARS	AXLES & HOUSINGS
RAILWAY TRUCKS		TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

overhauling loads where the motor is required to absorb power and act as a brake during part of the loading cycle. It is adaptable to programming and processing control.



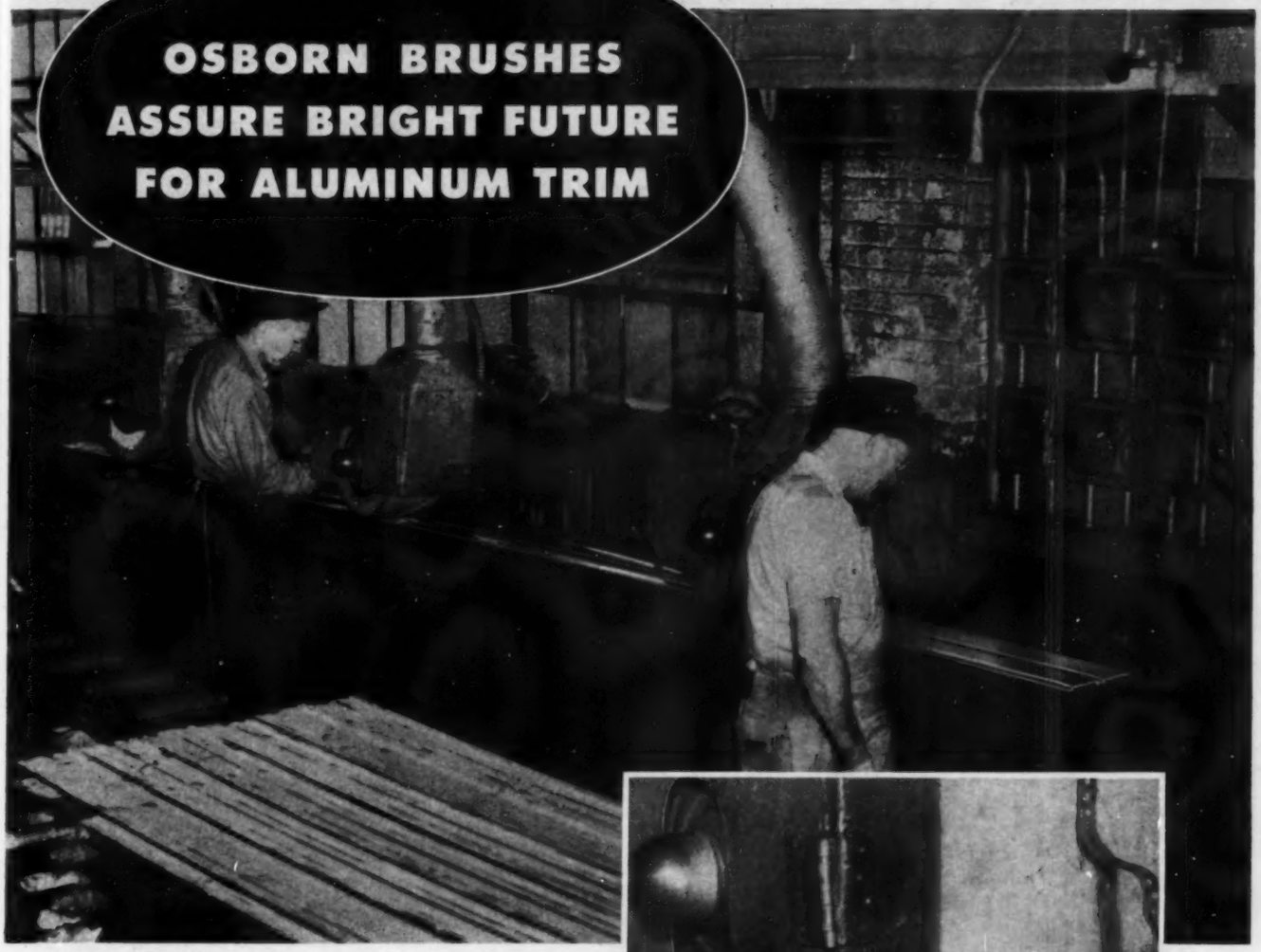
ELECTRONIC RECTIFIER useful where direct current is required, is made by Weltronic Co., Dept. K, 19420 W. Eight Mile Rd., Detroit 19, Mich. It replaces motor-generator sets where power from 750 to 2000 watts is desired and is known as the Series WR 40-50-60. Voltage is 115/230 dc., 115/230/460 ac.

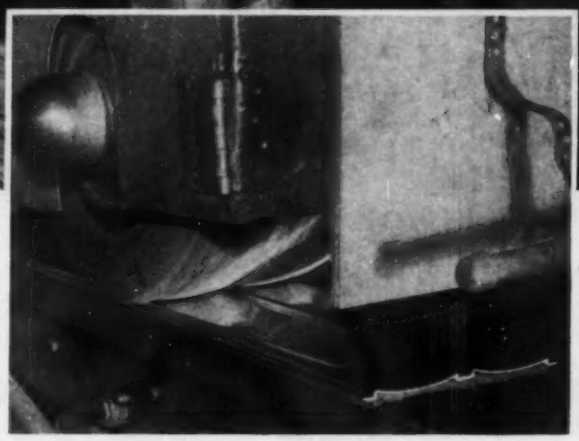
Wynn's Friction Proofing Oil Protects Bearings, Cams, Gears

Wynn Oil Co., Dept. AM, San Gabriel, Calif., announces a friction proofing oil for use with regular lubrication oils and greases. It is compounded for the protection of bearings, cams and other friction points in motors and machinery. When used in internal combustion engines, crankcase, transmission and differential, an increase in hp. up to 20% is claimed.

FOUR-PISTON HYDRAULIC pump, introduced by Miller Hydraulic Engineering and Sales, 3615 Hart, Detroit 14, Mich., weighs 30 lb. It will operate in either direction of rotation. At 1200 rpm., discharge pressure ranges from 0 to 3000 psi. and delivery is from 5.4 to 3.0 gpm.

OSBORN BRUSHES ASSURE BRIGHT FUTURE FOR ALUMINUM TRIM





THE dash and sparkle of aluminum trim is winning new applications for this metal yearly. And it takes Osborn Cord Brushing Wheels to give the overall surface of this material that final high luster and fine coloring so essential for a pleasing decorative effect.

Pictured above is the combination buffing and polishing operation employed in a plant producing aluminum trim for bus bodies. Starting at left the 16 ft. long sections are first processed by two conventional buffing wheels. Reaching the third station at right, the sheet receives its final and most important beauty treatment from an Osborn Buffbrush*—a new type of ventilated wheel brush made of a special soft cord that produces a fine finish and is especially effective on irregular surfaces because of its flexibility. Note in inset how this brush doesn't just ride the surface but follows every contour and reaches all those little hard-to-get-at corners.

Here's an example of where just the right brush employed at the right point in an operation saves time and money—produces a better product. How can you be sure that you are using brushes to their maximum advantage? That's easy—just ask for the services of an Osborn sales engineer.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

*Trademark

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

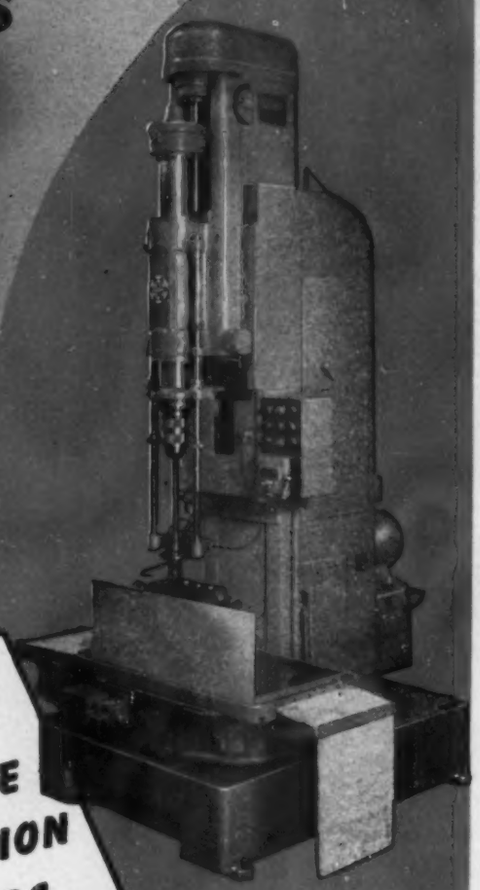
MICROHONING is
BETTER QUALITY . . .
GREATER OUTPUT
PLUS

High Precision Accuracy

Automatic High Precision Sizing

Fast, Heavy Stock Removal

High Precision Surface Finish



MODEL 72B

MICROMATIC OFFERS NEW QUILL-TYPE HIGH PRODUCTION HYDROHONERS

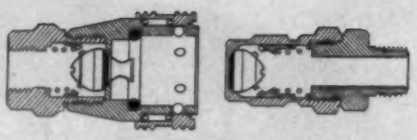
Completely automatic, electronic control of uniform size within tolerance of 0.0001 to 0.0003-inch is a production-proven feature of these new unit-assembled, hydraulically actuated, heavy-duty Hydrohoners.

With this simplified, spindle-in-quill construction torque and thrust is restricted to the centerline of the spindle—alignment is accurately maintained—weight of parts in motion is minimized—stroking speeds may be higher without increasing power input—all conventional mechanical linkages and hydraulic systems are simplified.

To explore the amazing, new possibilities of the Quicker, Better, Lower Cost Method of Production Processing by Microhoning.

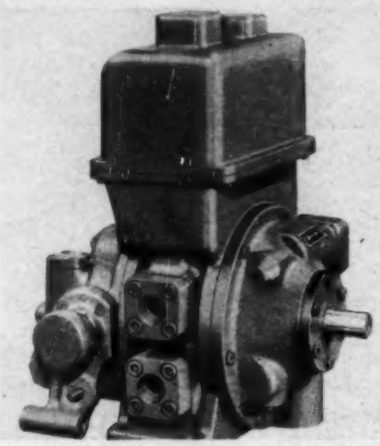
WRITE NOW for further specifications.

MICROMATIC HONE CORPORATION Los Angeles, Cal. · Houston, Texas · Rockford, Ill.
8100 Schoolcraft Ave., Detroit 4, Michigan, U.S.A. Guilford, Conn. · Brantford, Ont., Can



Hansen Disconnective Coupling Provides Two-Way Shut-Off

A quick-connective coupling, both members of which seal automatically when disconnected, is made by The Hansen Mfg. Co., 4031 W. 150th St., Cleveland 11, Ohio. Known as Hansen Series 8000, it combines two-way shut-off with connecting and disconnecting on fluid lines, either hydraulic or pneumatic. Valves are located in both socket and plug. Both valves are opened automatically by inserting plug into socket. To connect, pull back sleeve and push plug into socket; to disconnect, pull plug out, thus closing both socket and plug. Recommended for ⅜-in. lines, it is made with various female and male pipe-thread; hose-stem; or hose-clamp connections.



FLUID - POWER VARIABLE - DELIVERY feed pump has been announced by The Oilgear Co., 1330 W. Bruce St., Milwaukee 4, Wis. It is automatic pressure compensated, electro-hydraulically controlled, has fine and coarse feeds adjustable over 20:1 range, and provides from 13:1 to 265:1 variable ratios between feeding and rapid-traverse speeds

Holub Sandscott Plastic Screw Anchor Fastens into Any Material

Holub Industries, Inc., Sycamore, Ill., announces an all-purpose screw anchor known as the Sandscott plastic expanding anchor. It can be used with wood or lag screws for fastening into any material. The anchors are made slightly larger than the diameter of the hole to be drilled. The concertina expansion-

Here is the low-cost, motor-driven gas cutting machine you are looking for—the Airco No. 10 Radiagraph.

This machine cuts straight lines of any desired length in steel plate . . . arcs up to 42½ inch radius . . . and circles from 3 to 85 inches in diameter. Further it will prepare edges for welding with a straight butt edge, "V" groove, single or double "U" groove, single or double "J" groove, or double bevel groove without land . . . and it operates at speeds from 4 inches to 50 inches per minute.

Weighing only 41 pounds net, the No. 10 Radiagraph can be easily moved from job to job. To facilitate carrying, the machine has a hand grip on one end.

With this compact, nominally priced machine all shops engaged in preparing steel for welded fabrication can now enjoy the speed and economy of machine gas cutting.

For a copy of a booklet containing full details about the Airco No. 10 Radiagraph, write for ADC-614C. Address your nearest Airco office or Dept. A. M.-5867, Air Reduction, General Offices, 60 E. 42nd St., New York 17, N. Y.; in Texas: Magnolia Airco Gas Products Co., General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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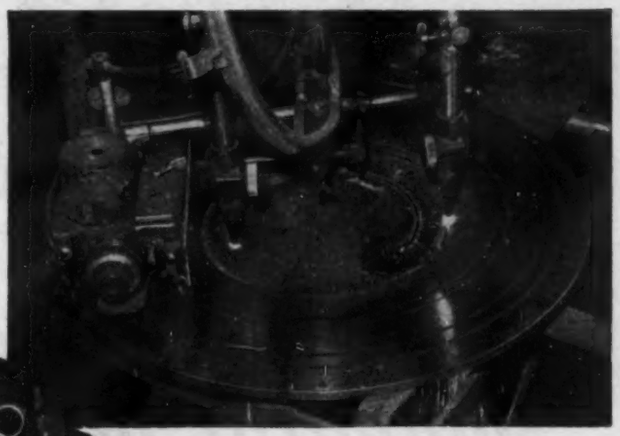
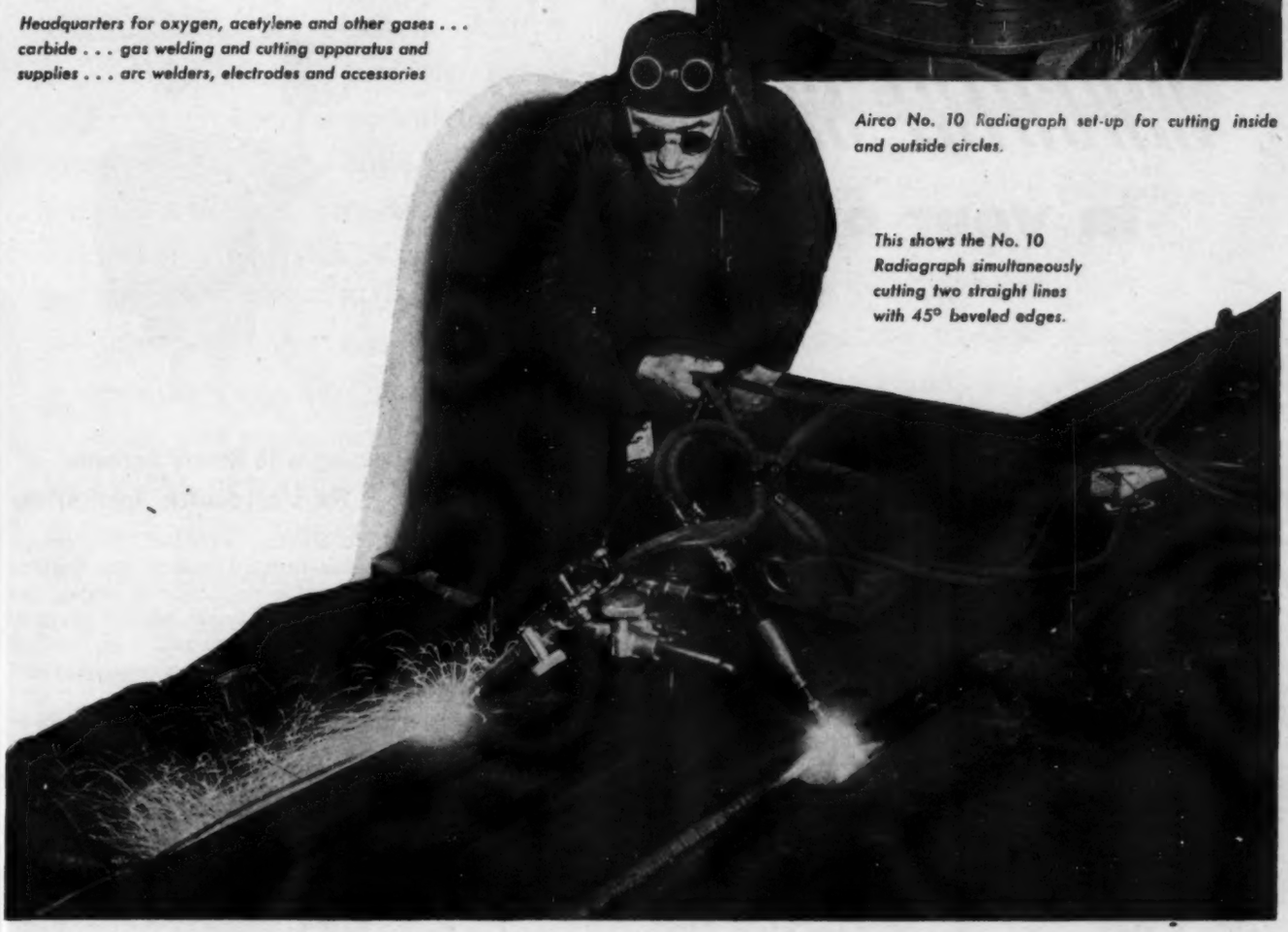
Headquarters for oxygen, acetylene and other gases . . . carbide . . . gas welding and cutting apparatus and supplies . . . arc welders, electrodes and accessories

low cost PORTABLE GAS CUTTING MACHINE

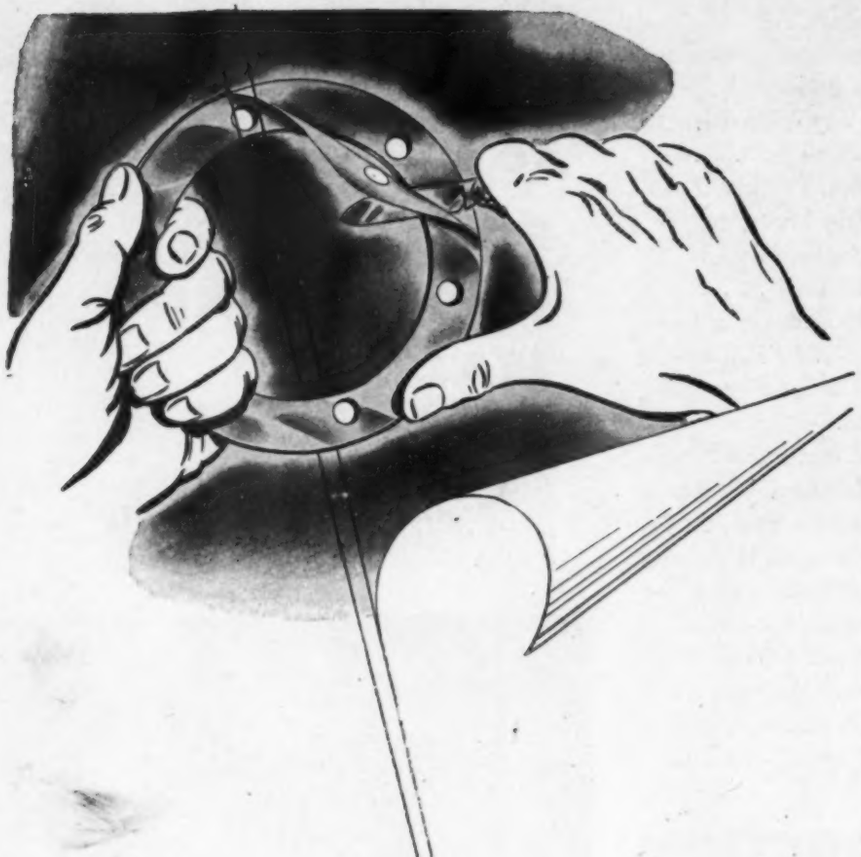
cuts steel faster . . . more economically



Airco No. 10 Radiagraph set-up for cutting inside and outside circles.



This shows the No. 10 Radiagraph simultaneously cutting two straight lines with 45° beveled edges.



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IF THE PERFORMANCE of the equipment you build hinges upon accuracy of service adjustments, consider protecting yourself by utilizing Laminum shims in original assembly.

Time-taking machining is saved. And proper servicing provided for. Good insurance. Your request for data invited.

Laminum shims are cut to your specifications. For maintenance and repair work, however, shim materials are sold through industrial distributors.

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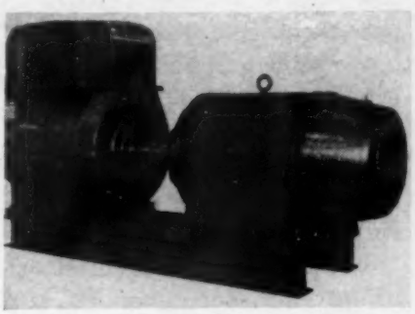
LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

type design enables the anchor to compress itself. The toughness of the plastic enables it to be driven into a tight hole, getting full use of the holding power available. The anchors can be had in seven sizes in various lengths to accommodate screw sizes ranging from No. 5 to No. 20, or ¼- and 5/16-in. lag screws.



GE Totally-Enclosed Generator In Ratings from 30 to 150 kw.

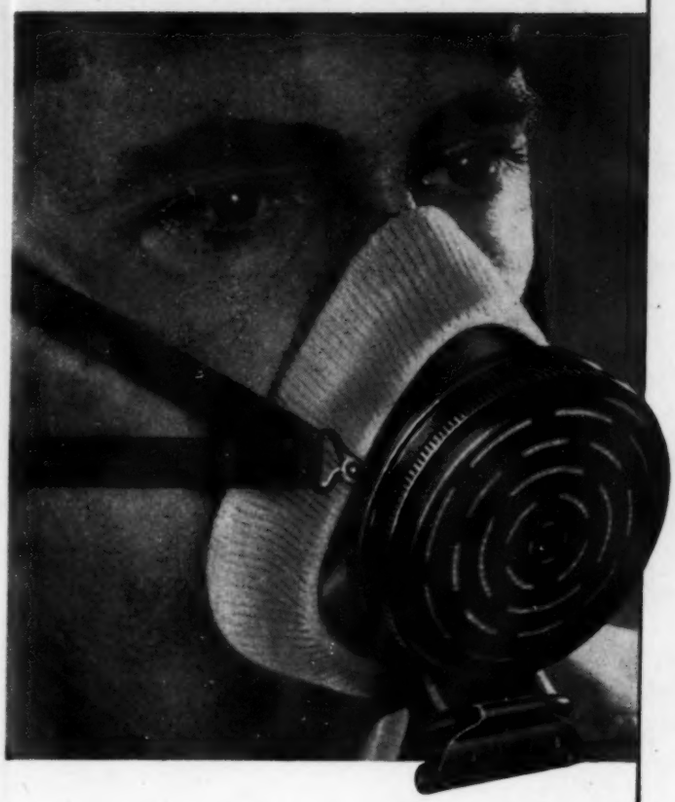
General Electric Co., Schenectady, N. Y., has announced totally-enclosed, unit-cooled generators. They are used in motor-generator sets or in other generating applications in non-hazardous atmospheres where ratings make totally-enclosed fan-cooled construction impractical. Available in rating of 30 to 150 kw.

Housing with Rotary Actuator For Limit-Switch Applications

Micro Switch, Freeport, Ill., introduces a type of switch housing for limit-switch applications, which has a rotary actuator to provide protection, actuating means, and conduit connection for the element enclosed in the housing.

The actuator shaft bearing provides protection against dirt, dust, and moisture. The conduit fitting has standard ½ in.-14 NPSM internal threads.

Called the LRM5, the unit has an operating force of from 4 to 12 oz., and a release force of 2 oz., min.



NEW AO R-2000 RESPIRATOR with Chemically Treated Filter

PROTECTS AGAINST DUSTS 24 MILLIONTHS OF AN INCH IN DIAMETER

First of its kind, the R-2000 RESPIRATOR features a chemically* treated felt filter of approximately five inches which does the work of previous filters eight times as large in area — and protects workers from poisonous dusts as small as 24 millionths of an inch diameter! This new and important development safeguards against a *combination of all dusts* — toxic, nuisance and pneumoconiosis-producing, while providing increased front and side vision due to reduced size of the filter container.

The advance in filtering efficiency is without any increase in low breathing resistance and the compact overall size of the respirator offers a new high in wearer comfort. For added economy, the disposable filter is equipped with a gauze pre-filter which extends filter life by preventing the passage of larger particles of dust and dirt. A special lightweight easy-to-attach face shield is available for use with the respirator. This shield protects eyes and upper face against impact of foreign particles. Approved by the Bureau of Mines.

*Provides 40 to 1 greater efficiency over untreated filters.

Safety Division

American Optical COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

IF *Quality* IS THE PARAMOUNT FACTOR IN YOUR GEAR REQUIREMENTS

Write your own ticket!

- We specialize in the mass production of precision gears to customers' specifications.
- We have the necessary facilities and skill to produce such gears in production quantities, and to meet any specifications that modern machine tools, under the supervision of New England craftsmen can turn out.
- You furnish the specifications — we'll produce the gears.

Our extensive facilities and modern machine tools are also adaptable to the manufacture of all kinds of various parts other than gears, such as the following:

SPROCKETS SPLINED SHAFTS SCREW MACHINE PARTS

up to 2¼" in diameter

We are also exceptionally well equipped to build, to your specifications, such mechanical units as—

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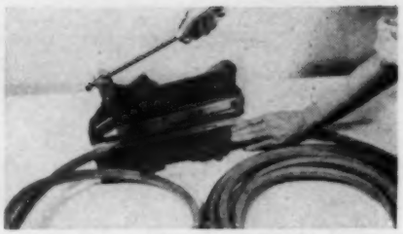
either in experimental or production quantities. Our well-known reputation is your guarantee of satisfaction. Let us quote on your requirements.

• PERKINS MAKES — In All Materials, Metallic & Non-Metallic Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Spur Gears, Ground Thread Worms

PERKINS MACHINE & GEAR Company

Springfield 2, Massachusetts



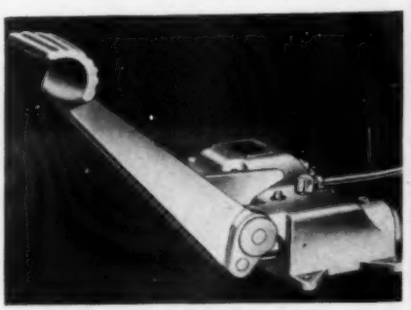
Schieren's Leather V-Belt Available in 100-ft. Rolls

Chas. A. Schieren Co., 30-38 Ferry St., New York, N. Y., announces leather V-belting which can be cut from a roll and spliced to fit any required centers. It is supplied in 100 ft. rolls, packed in boxes and made in A, B, C, and D sections. The belt is constructed with flat, full-grain leather side walls which are said to provide greater pulley-gripping capacity. It can be made endless, to fit any drive, either by lapped splice or mechanical fasteners.

The Schieren E-Z Lap Cutter cuts the leather on the bias across the belt, making a long, tapering, slant-wise cut.

Glyco Products Glycolube Series Permits Continuous Lubrication

Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y., announces the Glycolube series of lubricating compounds developed as lubricants for drawing, sheeting and stamping non-ferrous metals. Glycolubes are said to result in a brighter product, automatically apply a temporary corrosion-inhibitor film, and permit continuous lubrication. They are available in various combinations of properties, and in various forms, ranging from liquids to solids and from water-soluble to oil-soluble materials.



Lyon-Raymond Hydraulic Pump Gives Pressures to 1500 psi.

Lightweight hydraulic foot pump is being offered by the Lyon-Raymond Corp., 3806 Madison St., Greene, N. Y. The pedal-return spring is built inside the pump body

MEN
skilled by
experience
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MATERIALS
selected for each
job
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MACHINERY
that assures
precision

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Broaches, Gear Cutters,
Gear Shaper Cutters,
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ground and unground,
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Cutting Tools for
All Purposes

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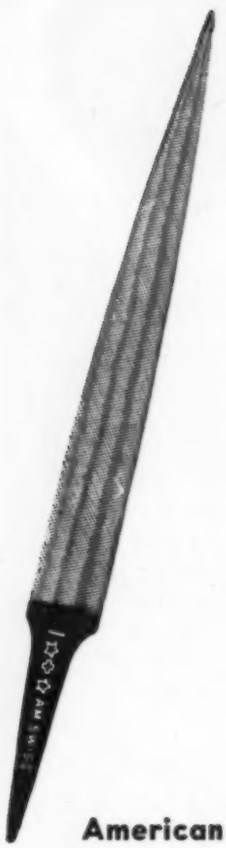
Have you a "SMALL PARTS" Filing Job ?



USE "AMERICAN SWISS" SWISS-PATTERN FILES

Small fillets, holes, slots, curves, edges and surfaces may seem to be troublesome filing jobs—but not if you use "American Swiss" Swiss-Pattern Files. When you standardize on this extensive line of precision tools, you have a selection of more than 3000 different shapes, cuts and sizes to choose from—including widths and diameters as small as 1/16-in., thicknesses as small as 22 B&S (.025) gauge, and cuts as fine as 200 or more teeth per inch. So, for "small parts" filing, as well as for all accurate or finishing filing, use "American Swiss" files—they will help you do better, faster, more economical work.

Buy from Our Local Distributor

American Swiss File & Tool Co., Elizabeth 1, N. J.

ASK FOR THEM BY THIS NAME

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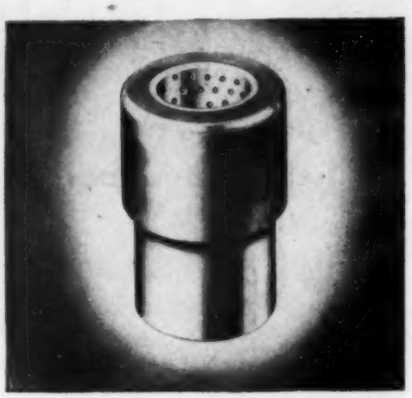
SWISS PATTERN FILES

and the release controlled by raising the pump pedal slightly. Weight of the pump is 13¼ lb., and pressures up to 1500 psi. are obtainable. The usable oil capacity is 15 cu. in.



Standard's Guide-Pin Bushings For Pressures to 10,000 psi.

Low-friction bushings said to increase the accurate life of die sets have been announced by Standard Machinery Co., Providence, R. I. These heavy-duty precision guide-pin bushings have a hard-steel body and a special bearing-bronze liner electrolytically alloyed with Indium.

Due to the use of Indium, a non-corroding metallic element with inherent lubricating qualities, bushings are said to perform satisfactorily at pressures to 10,000 psi. where normal lubrication is temporarily suspended and scuffing and scoring would normally occur. Indented spherical oil pockets are used to minimize friction. "Standard" Indium-Bronze bushings are available in seven sizes, from 1 to 3 in. I.D.

No Darkroom Needed to Process Kodagraph Autopositive Paper

A silver-sensitized paper for reproducing engineering drawings on blueprint or direct-process equipment has been announced by Eastman Kodak Co., Rochester 4, N. Y. The paper, called Kodagraph Autopositive, embodies a new type emulsion producing a high-contrast positive copy directly from a positive original. After printing, the paper can be processed in normal room light.

Kodagraph Autopositive can be used to eliminate redrafting of worn, discolored, or opaque drawings, and is said to make possible the production of blueprints heretofore regarded as unprintable. Either the print-through or reflex method of printing is used. Exposure time is comparable to that of conventional materials.

Rugged Federals

Year after year, Federal Presses deliver more press work per dollar to offset increasing labor rates and meet the demand for lower production costs. Federals also are performing a wider variety of jobs never before regarded as press operations. Their versatility is practically unlimited. Primary, secondary, and assembly operations are handled quickly and safely—with extreme accuracy. Burnishing, broaching, forming, staking, and high speed marking are handled with ease. Federal Presses are rightfully famous for precision work—saving time and manpower, reducing costs as well. Furthermore, they're ruggedly built to give years of continuous service. Write today for catalog of complete Federal Press line.

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AVAILABLE IN 8 SIZES—CAPACITY, 6 TO 80 TONS

Because Federal Presses are in such great demand today, delay in shipment is unavoidable. But remember, Federals are worth waiting for!

Truck Bodies on Casters Speed-Up Production!

Easily rolled to any part of your plant, these 3 cu. yd. tilt type bodies speed production and cut handling costs on raw materials, finished products or waste. Any number of these or other type bodies can be handled, from your loading platform, by one Dempster-Dumpster truck hoisting unit. As shown here, loaded bodies are rolled to loading points, picked up, hauled, dumped and returned . . . a continuous cycle of operation. Standard or special bodies in 1½ to 10 cu. yd. capacity are built to handle any type of material. Cost of installing is surprisingly low. Write for catalog 247 today.

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8 inch Stroke HY-DUTY MODEL

- ACCURATE
- VERSATILE
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You can depend upon the built-in accuracy and durability of Shape-Rite Shapers to withstand day-in and day-out capacity production. The speedy set up features and ease of operation will increase the output of precision work. Shape-Rite Shapers are Versatile, and will handle any type of work within the capacity of eight-inch stroke Shapers. Unexcelled for Tool and Die Makers and small instrument manufacturers. Complete specifications on request. *Write to Dept. A-24.*

Sales Service Machine Tool Co.

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ROUND TABLE Discussion

GOLDBERGING OR GOLDBRICKING

Properly handled, suggestion schemes pay because all the brains are not to be found under one hat. The large number of men who start at the bottom and get to the top is the best proof of this.

The man on the job is in a position to see things which are not open for others to see, and it is desirable to encourage him to put his ideas forward for consideration. However, if an idea requires a sample or model, it is for the firm to see to its provision, definitely not for the suggestor to do surreptitiously. If necessary, he should submit a sketch with his suggestion. To make samples during the firm's time, without their knowledge, is to spend their money beforehand and then to expect them to pay again in the form of an award. This would not be fair to the foreman or conducive to effective control.

One weakness in legitimate suggestion schemes in England is the inadequacy of the awards. These seem often to have no logical basis or connection with the value of the suggestion made. An actual example may illustrate this.

A suggestion was made, and accepted, for a process which was being continually used. The saving in labor cost alone was over one hundred pounds per annum. The man was awarded the sum of one pound. What would have been a fair return? Would one half of the savings, for one or more years, made possible by the suggestion, have been too much? The suggestor, in this case, made no more suggestions, and left the firm shortly thereafter.

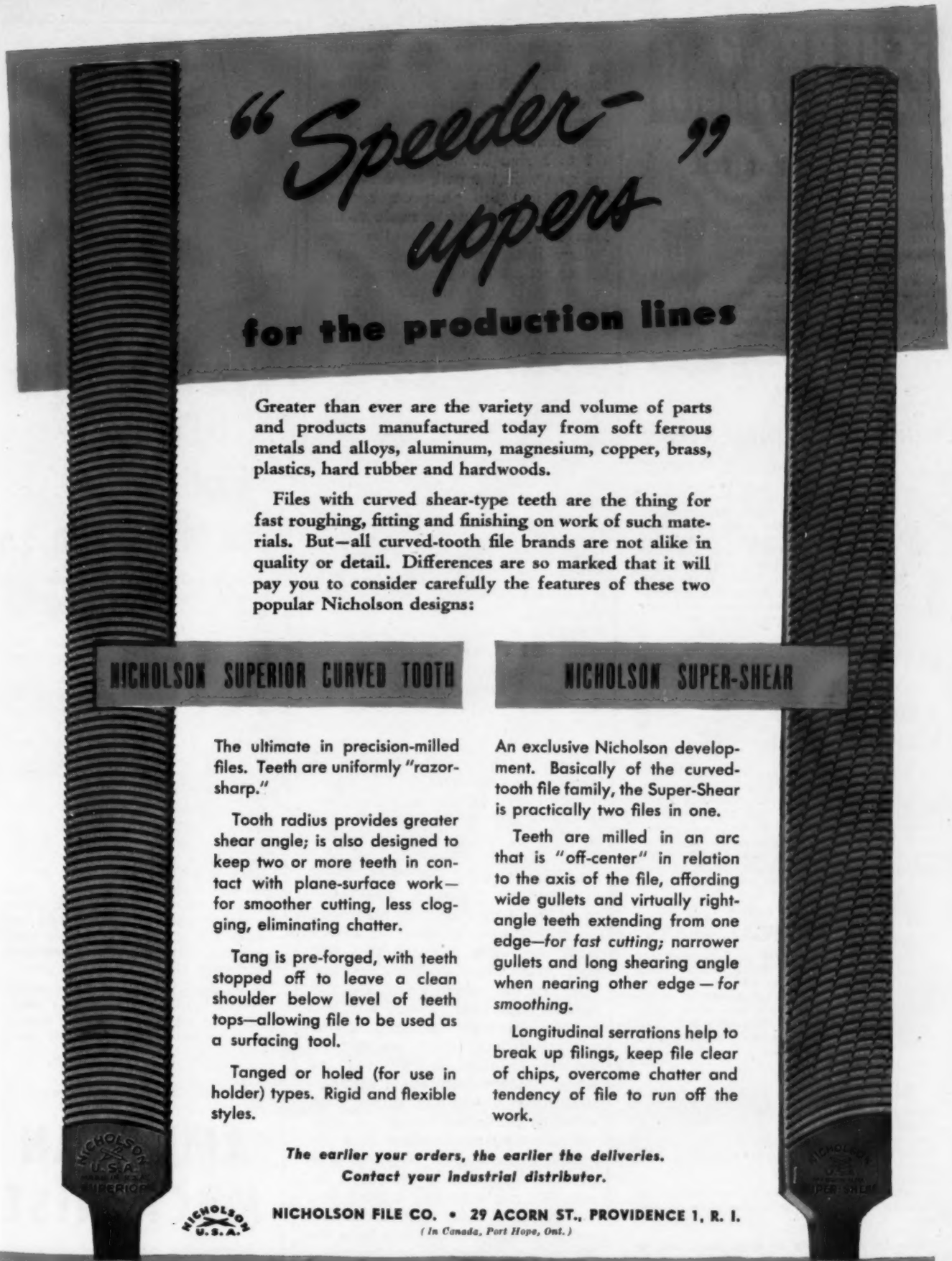
J. E. Powell
Lincoln, England

•

DOES A DIVVY NOW MEAN A DOLE LATER?

Depending upon the industrial or corporate level, one can marshal winning points for either side. It is this range from absentee ownership to cooperatives from profit-sharing to communism, that undoubtedly charges the question with so many insoluble answers.

Individual workmen are hard put to find reserves in times of stress, with far less collateral than industry for backing at the banks. Cheap



"Speeder-uppers"

for the production lines

Greater than ever are the variety and volume of parts and products manufactured today from soft ferrous metals and alloys, aluminum, magnesium, copper, brass, plastics, hard rubber and hardwoods.

Files with curved shear-type teeth are the thing for fast roughing, fitting and finishing on work of such materials. But—all curved-tooth file brands are not alike in quality or detail. Differences are so marked that it will pay you to consider carefully the features of these two popular Nicholson designs:

NICHOLSON SUPERIOR CURVED TOOTH

The ultimate in precision-milled files. Teeth are uniformly "razor-sharp."

Tooth radius provides greater shear angle; is also designed to keep two or more teeth in contact with plane-surface work—for smoother cutting, less clogging, eliminating chatter.

Tang is pre-forged, with teeth stopped off to leave a clean shoulder below level of teeth tops—allowing file to be used as a surfacing tool.

Tanged or holed (for use in holder) types. Rigid and flexible styles.

NICHOLSON SUPER-SHEAR

An exclusive Nicholson development. Basically of the curved-tooth file family, the Super-Shear is practically two files in one.

Teeth are milled in an arc that is "off-center" in relation to the axis of the file, affording wide gullets and virtually right-angle teeth extending from one edge—*for fast cutting;* narrower gullets and long shearing angle when nearing other edge—*for smoothing.*

Longitudinal serrations help to break up filings, keep file clear of chips, overcome chatter and tendency of file to run off the work.

The earlier your orders, the earlier the deliveries.
Contact your industrial distributor.

NICHOLSON FILE CO. • 29 ACORN ST., PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON FILES *FOR EVERY PURPOSE*

SCHERR aids to precision-production

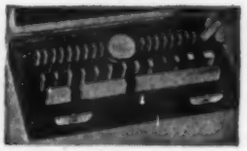
THE COMPARITOL

Where inspection accuracy to "Tenths" and better is absolutely essential in such parts as gages, threads, fine wires, cylindrical ground work, etc., the Scherr Comparitol will give indisputable results. It can be used by anyone with a few minutes' instruction, can be placed near machines for constant spot inspection, as well as used for final inspection. Long-lived patented knife-edge mechanism needs no oiling, has no gears, racks, multiple levers, pivots or bearings, no electrical connections, bulbs or transformers. Thousands in profitable use everywhere.

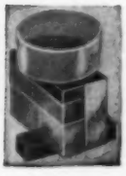
SCHERR DIAL INDICATORS

Last longer and cost less. Have an exclusive mechanism of extra sturdiness, with only three moving parts. No quick spinning wheels nor unhardened racks. Furnished with standard back or with ball-joint back for setting at any angle. Contact points for all needs. With clamp holder, extension bar, tool-post holder, in compact metal case.

ULTRA-CHEX GAGE BLOCKS



The last word in modern basic accuracy brought within the grasp of all shops large and small. Sets in size for al budgets. All locks accurate to 5 millionths. Illustrated is the 34-block set, giving 80,000 combinations in steps of 1/10,000", with optical flat for checking wear. Low prices allow for constant practical shop use in setting tools, checking gages, locating holes in jigs, and fixtures, etc. Many shops use a number of sets, with one master set for reference.



OPTICAL FLATS

Essential for checking wear and flatness of lapped surfaces. Reveal deviation in millionths from absolute flatness or parallelism of micrometer anvil, gage blocks, refrigerator, airplane parts, etc. Sizes up to 4" or over in optical glass or quartz.

SINE BAR

Thoroughly normalized for undeviating accuracy. Two sizes — 1"x⅝"x5", and 1"x1¼"x5". Type G has ground edges. Type L, lapped edges. Extremely low price makes this valuable tool available for the individual owner as well as in quantity for the toolroom.

Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.
200-0 Lafayette St. New York 12, N.Y.

money in large amounts is available to most corporations with any standing under broad, loose financial boundaries. Witness two launchings of embryonic automobile manufacturers within the year with prospects that looked about as sure as a 7 to 1 shot at Belmont. But for the man with the pail, the reception is cold and the prospects barren. Recourse then must be made to the loan companies at triple the rate.

Since it is considered good practice to set aside in prosperous times for the cyclically lean, there is nothing unnatural in the individual's desire to do likewise? If such a nestegg is to be built, it must come from amounts that appear over and above the average wage.

A large measure of extra profit in boom or better times is due to the workman's own effort; not necessarily from rubbing the front-office touchstone.

An actual example is a Vermont manufacturing concern, individually controlled, but employee energized. When conditions permitted, company money plus moral support, built a residential subdivision for employee ownership.

After a few years came a depression. The banks could take over and existing wages prevail—or the boss could carry on, but at practically dole wages for the employees. It was up to them. Quickly and unanimously the dole was chosen.

Years later during a period of labor unrest the owner was asked if he'd ever had any union disruptions. "Waal," he said, the Yankee twang broadening with enjoyment at the telling, "seems to me did about six months ago. Fella came in here an organizer, and asked could he go out in the plant and organize. Sure, I said, go ahead, right out there through that first door. Waal, sir, I was here aworkin' right in my office when about a half an hour later I heard a ruckus out in the yard. Stepped to the window just in time to see that organizer fella go sailin' over the fence. Threw him out. Yet, you might say we've had union here, although that's the closest we got."

Eliminating corporations with absentee ownership at one end and national remote union control at the other, I'd say supposing a divvy now did mean a dole later (which it needn't), by all means let's have the divvy. American management is good, but not so good that they can guarantee "No divvy now—no dole later."

A. M. Elliott
Le Roy, N. Y.

MODERN TESTING METHODS— What they are... How to use them...

"Non-destructive Testing Methods", a 24-page *American Machinist* Special Report, gives all the facts on how to scientifically test parts, pieces, structural materials, rough castings, dies, and any other formed piece subject to defect.

This Special Report explains in detail the supersonic, radiographic, spectroscopic and magnetic methods of Inspection . . . points out how each can be used effectively. Illustrations, graphs, photographs, clarify the factual, authoritative text.

Non-destructive testing, recognized as the most practical way of checking on a production basis, is particularly important because a thorough check at all points is possible without damage to the part or material being tested. This compact, up-to-the-minute survey on non-destructive testing goes into the many new or improved methods used today, points out their particular advantages.

If you would like copies for distribution to your staff or for your own ready reference, we have a limited number available for distribution at 10¢ each.

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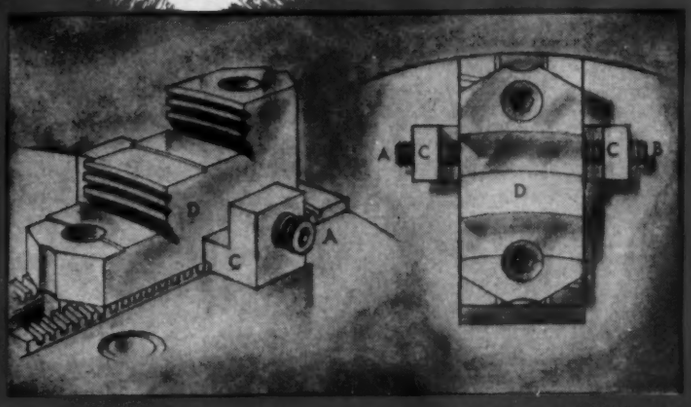
AMERICAN MACHINIST

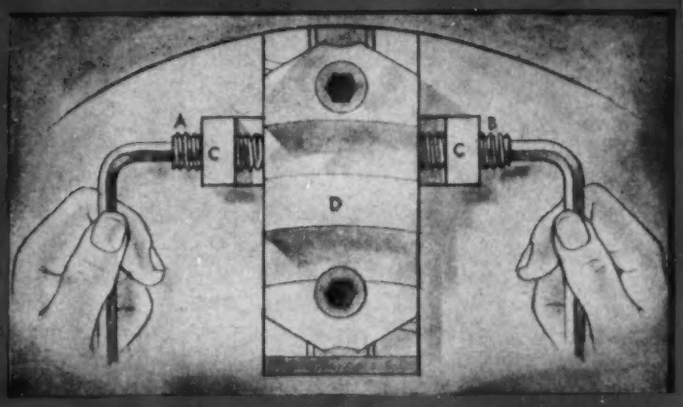
Magazine of Metalworking Production

330 W. 42nd STREET
NEW YORK 18, N. Y.

CUSHMAN "ACCRALOCK"



"Accralock" adjustments are obtained by loosening screw "A" and tightening screw "B," or vice versa, which causes key "C" to move to the right or to the left. This causes jaw "D" to move outward or inward under very precise control.



One full turn of the screws will move the jaw in or out .010". It is evident therefore, that accuracy of adjustment as close as .001" is easily possible. After adjustment has been made, tightening both screws positively locks the jaw in position.

PRECISE ★ POSITIVE ★ MINUTE SAVING

Power chuck jaw adjustment

One of the most important of recent developments in the chuck field.

1. Positive adjustment of top jaws to super-precision accuracy.
2. Simple and easy to manipulate.
3. Few parts, with little or no wear.
4. Assurance of positive rigidity and safety under heaviest loads.

A most important "plus" to the time and cost savings possible through the use of Cushman Power Chucks.

An exclusive feature of

CUSHMAN
SERRATED ADJUSTABLE JAW
POWER CHUCKS

Power chucking devices enable operators to do *better* work and *more* work with far less fatigue. Write for your copy of the new catalog PO-62 describing this equipment in detail.

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONNECTICUT

NO SCRATCHES . . .
LONGER HONE LIFE
with SUPERKOOL *

. . . reports
D. W. DEACON
D. A. Stuart Oil Co.,
Representative

This customer is honing cold drawn steel tubing on a Barnesdrill vertical No 307 honing machine with a micromatic head. A 120-M Bay State stone removes 30 to 35 thousandths on the I. D. With Stuart's SUPERKOOL* Base mixed 4 to 1 kerosene no tool marks are in evidence, stone life is increased considerably, the finish is excellent and the customer praises SUPERKOOL No. 41* highly.

Douglas M. Dixon

* SUPERKOOL

. . . Stuart's Superkool is a concentrated base cutting oil with high anti-weld capacity and low frictional characteristics. Its light color affords clear visibility on operations where close gaging or constant inspection is necessary. Superkool is chemically stable, sterile, and has no objectionable odor. These are only a few of the reasons why it has been a standard in hundreds of plants for over twenty-five years.

Ask to have a Stuart Service Engineer discuss your cutting fluid requirements. SUPERKOOL Booklet available on request.

STUART *service goes with every barrel*

WRITE FOR DETAILS

D. A. Stuart Oil Co.

2729 SOUTH TRAY STREET, CHICAGO 23, ILL.

FRIEND OR FOREMAN?

In many places we have seen a man start a small business that grew in size. When a son became old enough he joined in the business, and as the business grew larger, another son, relative or friend was added to the executive staff. Everybody knew everyone else in the business and all were satisfied with the way it was run.

However, when the business began to grow still larger, up to a point where no one in the organization had occasion or could get acquainted with those managing it, criticism would begin to creep in if relatives or friends were given the best jobs.

Cases have been known where a man in authority seemed to find a place for all of his relatives and friends. In such cases the rank and file in the organization cannot be convinced that all is fair or that they have all been placed for the best interests of the organization.

Absolute fairness is the greatest asset that a foreman can have. The average man will overlook many other weaknesses if he knows that he can always depend on his foreman being fair.

John Mark May
Watervliet, N. Y.

•

FRIEND—OR FOREMAN?

Should a foreman go fishing with one of his men? If he is of the right calibre, I can see no reason why he should not conduct his outside activities with the same degree of freedom as anybody else — school teachers excepted!

A foreman is, in the first place, supposed to be a human being, although at times, display decidedly inhuman traits. What he does in the shop and what he does on the outside are two different things.

This whole question of foremanship ethics seems to revolve itself upon what the other fellow thinks. We do come in contact with grumblers, trouble-makers, and bellyachers. If we are going to conduct our lives to conform to their whims, we're certainly not going to get much of a kick out of it.

Let the foreman be an ordinary human being and enjoy his inalienable privileges as long as he does not let them interfere with or influence the efficient functioning of his executive duties. Just so long as warm companionship and piscatorial discussions prevail — leaving the troubles of the shop to smoulder until they return—then the trip to Lake Chatham is worth the effort. As long as the outing does not breed familiarity, how can there be any objections? If the foreman is fitted for his job, when the pair get back in harness again, the lake and its contents are a thing of the past.

I once knew a foreman who regularly went on a first-class spree with one of his men. This stimulated pair argued often to the point of hostilities—while riding the familiar rail —and called each other names. But when they returned to more serious business on Monday mornings, one would think that they were total strangers!

There is one decided advantage in taking your men with you on a fishing trip, Mr. Foreman: you can certainly pick out the good liars!

John Homewood
Ontario, Calif.

•

If the right type of man is chosen for foreman, he can be a fine friend to his men and still do a good job.

Friendly get-together trips with foremen and men in the plant not only make close friends of the men, but wipe away little bits of friction and bad feeling that occur in the best of shops between supervisor and employee.

The first world war brought many changes in industry. In lots of plants there was week-end work during those years, and the majority of concerns allowed recreational activities to lapse; fraternalizing between the help and foreman was frowned upon by management. Today, however, there seems to be a revival of the old times.

Employers are urging foremen to get to know their men thoroughly. There is no better way than to go along on a fishing trip with a few of the men.

The right type of boss would, if someone started talking shop, remark that he came out fishing to forget the shop.

Arthur Silvester
Niantic, Conn.

•

EXCUSES OR EXCELLENCE?

It is evident that for the most exacting and fastest work the best of machinery is required. However, very good work can be done on machines that are not of the latest design and that have seen much service, when operated by those who are familiar with the tools and can use to advantage the tricks that bring the best results.

We would all prefer to be sur-

HYDROPTIC-B

For Milling, Boring, Drilling and Measuring

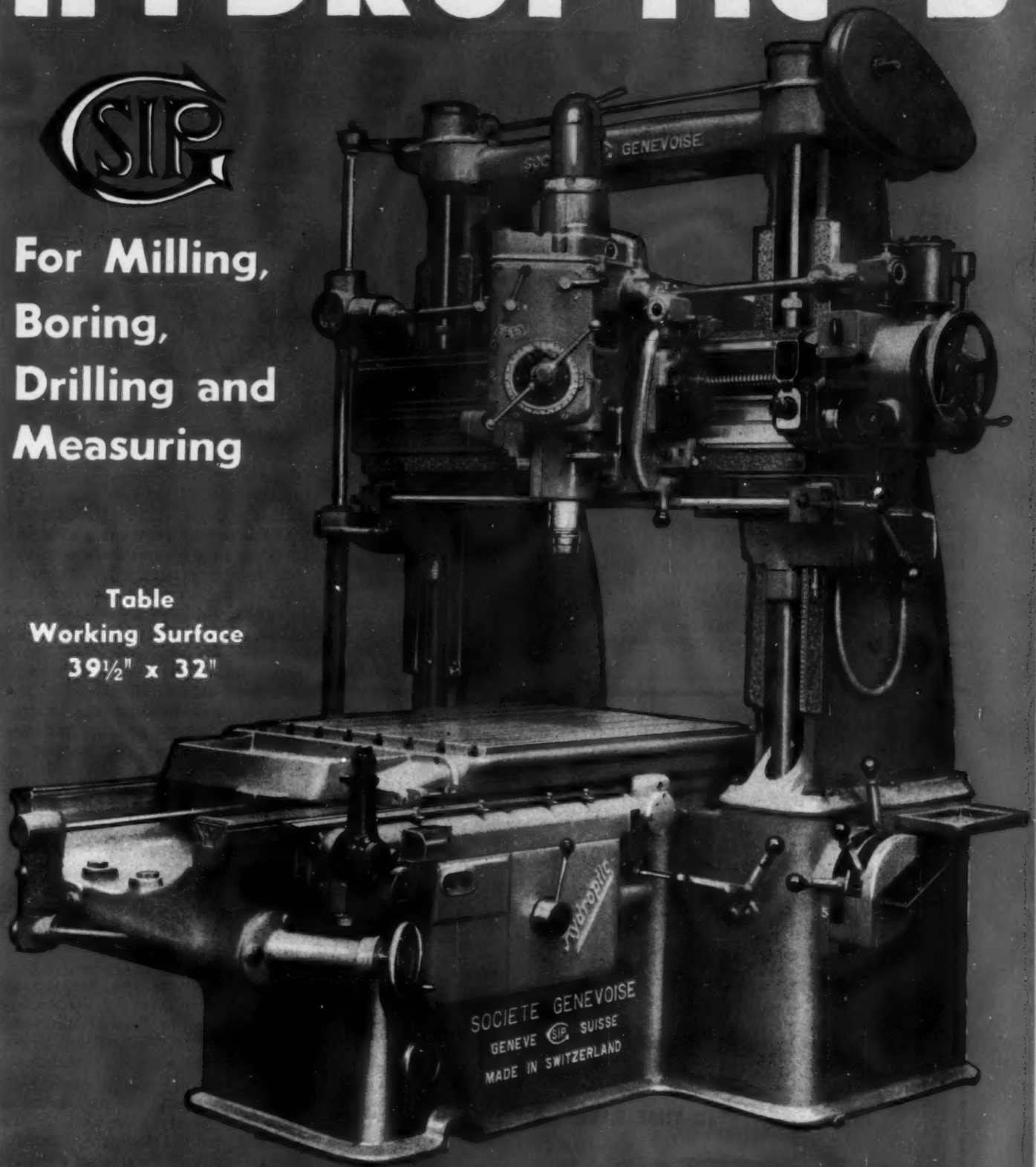


Table Working Surface 39½" x 32"

On the Hydroptic-B Jig Boring and Milling Machine, work can be laid out . . . machined . . . and measured in one set-up. Accuracy for all settings of work table and spindle head guaranteed to 0.0002". Write for complete specifications.

COSA CORPORATION

624 Chrysler Building New York 17, New York

rounded by perfect conditions, but since this is not always the case, good work must be done with what is at hand.

Each machine that has seen considerable service has usually, in addition to its regular wear, some additional feature that needs watching. This the operator needs to locate and favor as much as he possibly can.

Material that is not uniform or is of poor quality—in fact all varying conditions—make it necessary for the foreman and the operator to study their jobs constantly until the work is coming through satisfactorily.

It is advisable to keep the same man on the job for which he has become educated as long as it is possible and practical. This is sound economy and good for worker morale.

Such procedure applies to each job and each man, and when the lots are large, works very well. However, no shop can meet competition when forced to use outmoded tools. The best it can do is to tide along for time until better equipment can be secured.

Abel Blakeman
Watervliet, N. Y.

NEW BOOKS

POWDER METALLURGY — PRINCIPLES AND METHODS—*By Dr. Henry H. Hausner. Published by Chemical Publishing Co., Inc., Brooklyn, N. Y. 307 pages, 8¾ x 5¾ in. Price $7.*

Readers of AMERICAN MACHINIST will remember Dr. Hausner as the author of two direct and compact articles on powder metallurgy about a year ago. These two make up chapter 2 of the present book, and a diagram from the second forms the jacket illustration—facts which we recall to your mind for two reasons:

1. This book is as good as those articles were.

2. Dr. Hausner somehow overlooked us in his credits.

This is a definitive work in three major parts: 56 pages of general data on the subject, 111 pages of graphs and tables on methods, and a 120-page chronological bibliography of 1,064 published articles, etc., on powder metallurgy from 1800 through 1945. With the 6-page glossary of terms in the front, the book provides the answer to normal questions and gives sources for answers to the unusual ones. Principles are explained in tables and graphs, methods of manufacture of metal powders are given, and commercially available powders with their applications are listed. Effects of various steps in the process on physical properties of the metal compact are discussed in detail. If you have to do with powder metallurgy, plan to or use metal compacts, this book will be of help.

•

PREPARATION OF COMPANY ANNUAL REPORTS—*By Earnest Dale. Published by the American Management Association, 330 West 42nd St., New York 18, N. Y. 104 pages. Price $2.00 to members, $3.00 to non-members of the association.*

Objective of this research report is to contribute to the improvement of annual reports on the assumption that the annual report is a vital instrument in a corporation's relationship to the groups with which it deals. The groups are varied, so the report should have a wide audience.

The author has assembled and analyzed the experiences of many companies. He deals with the criteria of a good report, all phases of the financial and non-financial narratives and even its printing and distribution. He does not suggest or recommend any new accounting procedures, but reports what is actually being done, with emphasis on best practices. So many pertinent suggestions and comments are offered on procedure that this report should be made required reading for those that either prepare or influence the preparation of annual reports.

•

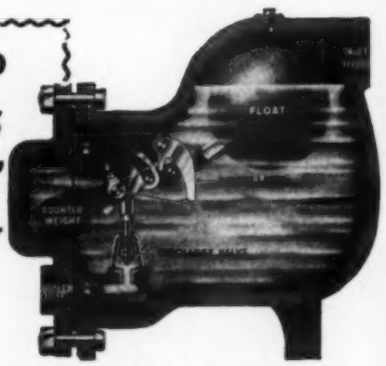
TESTING OF PARTS AND ASSEMBLIES. *96pages. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $1.50.*

This symposium of six technical papers is jointly sponsored by the A.S.T.M. and the Society for Experimental Stress Analysis. Subjects covered are: (1) fatigue strength of lap joints in magnesium alloys; (2) fatigue characteristics of magnesium castings, (3) endurance as a criterion in design, (4) pneumatic fatigue machines, (5) means of improving fatigue resistance of automotive rear axles, and (6) stress concentration and fatigue strength of engine components.

NICHOLSON WEIGHT OPERATED TRAPS

OFFER

A PRACTICAL WAY TO
Protect All Air Tools
and CUT "JAM TROUBLE"



Weight-operated for positive leak-proof action, Nicholson air traps offer dependable protection against corrosion and jamming of tools, and blemishing of parts caused by unwanted water and oil in air. Four types. Pressures to 1500 lbs. Stainless steel working parts Catalog 444.

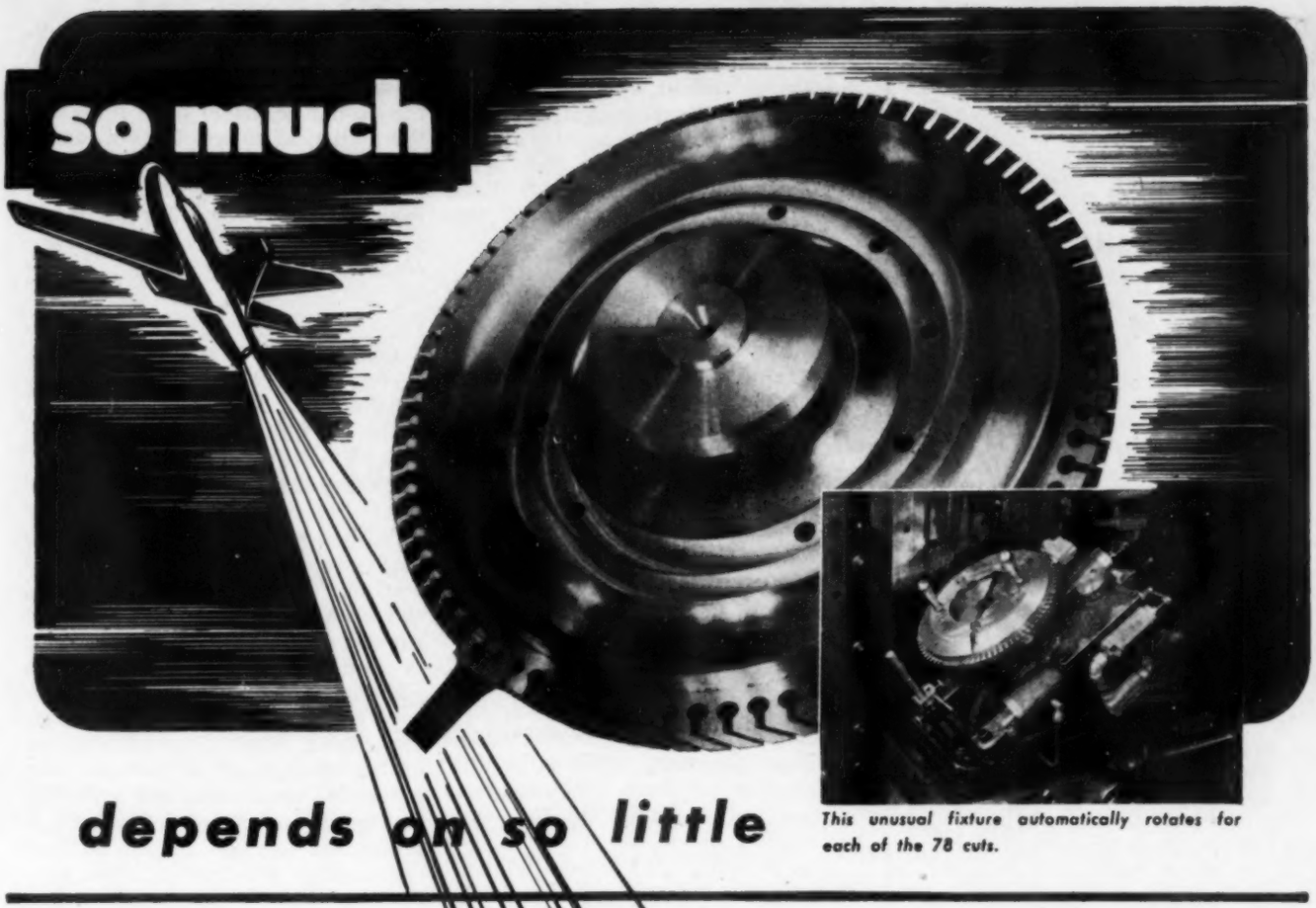
TWO TIME-TESTED TIME SAVERS BY NICHOLSON

Nicholson Expanding Mandrels save the time lost in making or looking for solid arbors. Set of 14 of these widely used tools does work of 209 solid arbors. For all bores, ½" to 7". Bulletin 1043.

Nicholson Control Valves are custom-constructed to suit specific pressures and mediums. Plant records show greater durability and savings in maintenance time. For all mediums. Pressures to 5000 lbs. Catalog 545.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

so much depends on so little



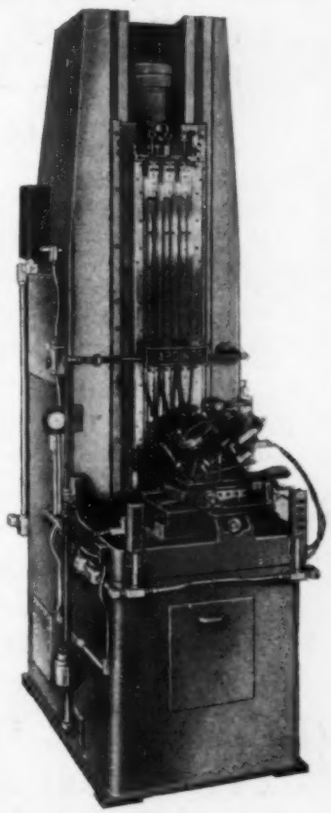
This unusual fixture automatically rotates for each of the 78 cuts.

Jet propulsion engines utilize every last fractional ounce of power. To achieve this, these tiny rotor blades must fit, with extraordinary precision, their appointed slots in the air compressor wheel. Only by broaching can the exacting tolerances required on both wheel and blades be attained with accuracy, economy and speed.

Seventy-eight angled slots are broached in the wheel by a Lapointe 15 ton, 66" stroke single ram machine, with a fixture designed to hold the piece at a 35° angle, and properly position it for the cuts. Three operations, roughing, semi-finishing and cutting the ball-shaped aperture at the base of the slot result in tolerances within .0005 inches, while maintaining a profitable production rate.

Since virtual perfection in machining is required to keep vibration to a minimum at tremendously accelerated speeds, the blade, too, is broached with extreme accuracy.

Comparable to broaching's contribution in this new field is the way this modern method of machining is meeting the ever-increasing demands of industry. Write Dept. 15 for 124 page Instruction Manual, containing full specifications on Lapointe machines.



15 Ton, 66" Stroke
Single Ram Machine

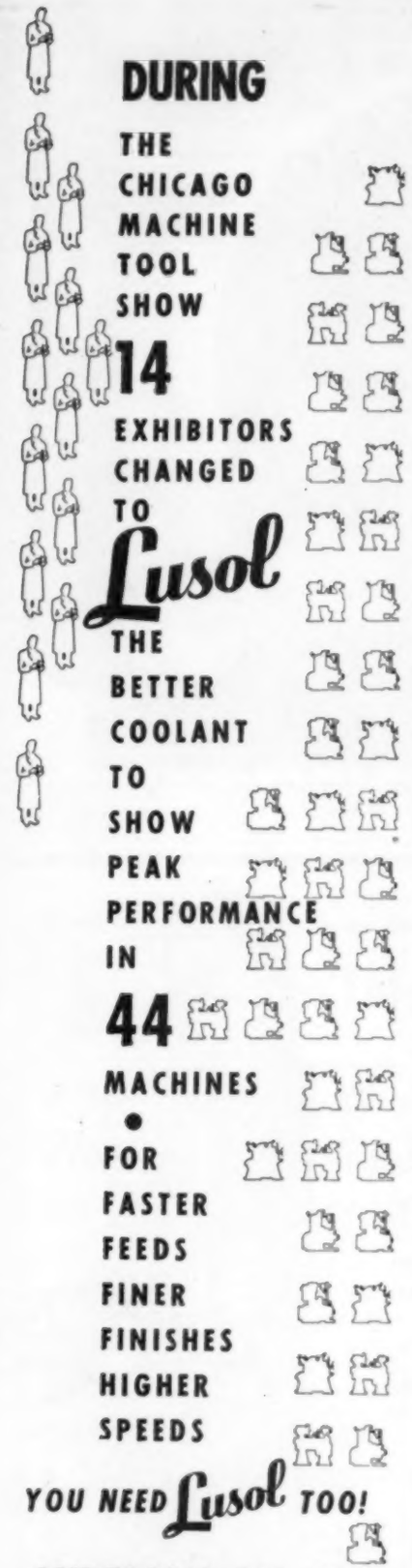
HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES



BUSINESS PLANNING AND CONTROL—*By Floyd H. Rowland, management consultant, vice president of Associated Development and Research Corp., senior partner of The Floyd H. Rowland Co. Published by Harper & Brothers, 49 East 33rd St., New York 16, N. Y. 337 pages. Price $4.00.*

The author contends that present trends point to ever-increasing difficulties in maintaining satisfactory profits and that there is every indication that only the well-planned business can fulfill its obligations.

With these thoughts in mind, he presents this book as an aid to top management in its job of examining and correcting fundamental weakness, of reorganizing its business to meet changed business conditions, of developing sound programs.

The book is written concisely to explain clearly the techniques of control. The first part of the book, Business Planning, deals with the development of a comprehensive business program, outlines factors in product selection, and discusses market analysis, sales methods and production plans.

The second part, Business Control Techniques, covers specific techniques of budgetary control, organization procedures, personnel policy, employee selection, wage administration and incentives. As presented, the book should serve well as a management reference.

●

CONTROL CHARTS—*By Edward S. Smith, professor of mathematics, University of Cincinnati. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 161 pages. Price $3.00.*

This book, intended as an introduction to statistical quality control, is directed to those who want a working knowledge of its methods and who do not want to enter too deeply into the mathematical aspects.

The typical executive does not need to know the mathematical theory underlying statistical control. But he should be familiar enough with its application to realize, and take advantage of, the improvement in products with no corresponding increase in cost that is made possible by its adoption. For that purpose, this book suffices.

Control charts for averages, ranges, fraction defective, number of defectives and number fo defects are explained thoroughly, yet simply. Three-sigma limits and standard-deviation charts are also discussed to complete the treatment of the subject.

In his effort to simplify the text, the author seems to have neglected the statistical sense of the meaning of control, but this does not detract from its value to the intended audience. To adapt the book for use as a textbook, practice exercises are included for the student.

●

PRINCIPLES OF INDUSTRIAL ORGANIZATION—*By Dexter S. Kimball, and Dexter S. Kimball, Jr. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. Sixth edition. 531 pages. Price $4.50.*

Published originally in 1913 and ever since used widely as a text in the teaching of management principles, this book in its 6th edition has been revised to include all latest phases of the business of managing men and material.

Its coverage is immense—and with astonishing detail. From discussions of the background of industry, the industrial revolution, the economic and social effects of inventions, it progresses through policy making, organization, plant construction, production control, purchasing, costs, wage administration and industrial relations.

The section on job evaluation and merit rating is entirely new in this edition, while much material has been added on industrial legislation, unionism, inspection and scientific management.

●

INSURANCE SERIES BULLETINS—*Published by the American Management Association, 330 West 42nd St., New York 18, N. Y., from papers presented at the 1946 insurance conference.*

Bulletin No. 65 (43 pages—$0.75)—Trends in Workmen's Compensation by William A. Sullivan, Today's problems under Workmen's Compensation by George E. Peterson, Control of Workmen's Compensation Losses by Stanwood L. Hanson, The Employee's Viewpoint on Group Hospitalization and Medical Care by Adolph Held and Some Aspects of the Law of Aviation Workmen's Compensation by Kenneth R. Thompson.

Bulletin No. 67 (28 pages—$0.75)—Trends in Social Insurance by A. D. Marshall, Educating the Employee in Fire Loss Prevention by Joseph A. McGucklin and Today's Problems in Crime Insurance by Lewis E. Eldridge.

HALF-HOUR CLEANING JOB

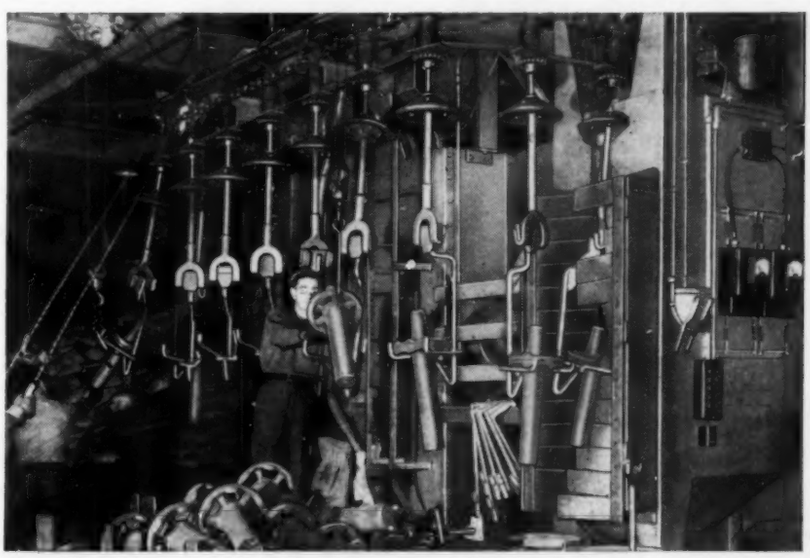
Wheelabrated in 1½ MINUTES

THE PROBLEM—Due to the excessive time required to clean forged aviation crankshafts, propellor shafts, etc., production schedules were difficult to maintain at Wyman-Gordon Company, Worcester, Mass. Special individual handling of the heavy, bulky pieces made the work slow and costly. The daily cleaning of more than 200 tons of smaller forgings presented an additional problem.

THE SOLUTION—The installation of a Wheelabrator Cabinet with heavy duty conveyor system for handling the larger pieces on a production line basis was made. Two airless Wheelabrator blast units are employed in the cabinet to provide complete abrasive coverage of all pieces and to permit the cleaning of the many different sizes of forgings produced.

Cleaning time for 550 pound crankshafts and other bulky, heavy pieces was reduced from 30 minutes to 1½ minutes. A steady procession of these large forgings passes through the machine at a continuous rate of one every minute and a half.

For cleaning smaller forgings, five Wheelabrator Tumblasts are utilized. The daily production of more than 200 tons of miscellaneous forgings is handled in these machines.



Cleaning forgings in a Wheelabrator Cabinet at Wyman-Gordon Co., Worcester, Mass.

Partial List of Heat Treat & Forged Parts Cleaned by Wheelabrator

Bearings	Gears
Cutlery	Spines
Pinions	Rakes
Shovels	Hoes
Axles	Valves
Springs	Chains
Wheels	Sprockets
Tool bits	Drills
Wrenches	Pliers
Washers	Files
Saws	Chisels
Hammers	Dies
Reamers	Shafts

Used by Leading Heat Treat & Forge Shops

S.K.F. Industries, Inc.
Thompson Products Inc.
Timken-Detroit Axle Co.
Allis Chalmers Mfg. Co.
Reed Roller Bit Co.
Stanley Rule and Level Co.
Remington Arms Co.
Ford Motor Co.
Cushman Chuck Co.
General Electric Co.
L. S. Starrett Co.
Nash-Kelvinator Corp.
Ex-Cell-O Corp.
Caterpillar Tractor Co.
Timken Roller Bearing Co.
Kelsey Hayes Wheel Co.
Ingersoll-Rand Co.
Oliver Farm Equipment Co.
Ross Gear & Tool Co.
International Harvester Co.
Billings & Spencer Co.
Plomb Tool Co.
Park Drop Forge Co.
Simonds Saw & Steel Co.
Union Fork & Hoe Co.

Write for latest booklet "CLEANING PROBLEMS SOLVED . . . in the Heat Treating and Forging Industry."

American
WHEELABRATOR & EQUIPMENT CORPORATION
(Formerly American Foundry Equipment Co.,)
317 S. Byrkit St. Mishawaka 6, Ind.
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Cleco Rammers

CARRY THEIR WEIGHT... JUST GUIDE 'EM TO THE WORK!

Want fast, easy-holding rammers for either floor, flask, bench or core work? You will find exactly the right model for your job in the complete Cleco line.

in addition to being great labor savers, Cleco Rammers improve casting quality by insuring uniform mold density. All models feature end pressure-seating valves that actually improve with use. The smaller models have effective poppet type throttles, while the floor models have snap throttles—both types are trouble-and-leak-proof. Large oil chambers insure efficient lubrication at all times. *Write for Bulletin 76B.*

Chippers, grinders, core breakers and air line accessories are also included in the Cleco line for the foundry.

FLOOR RAMMERS

No. 5 No. 4 No. 1F

No. 4B No. 1 No. 0B

BENCH RAMMERS

SPECIFICATIONS

	No. 0B	No. 1	No. 4B	No. 1F	No. 4	No. 6
Length (including Butt)	17"	20½"	24"	43"	48"	49"
Weight (including Butt)	5¾ lbs.	12¼ lbs.	23½ lbs.	16 lbs.	22 lbs.	33¾ lbs.
Bore and Stroke	1" x 2"	1" x 4"	1¼" x 5"	1" x 4"	1¼" x 5"	1½" x 6"
Speed in Strokes per Minute	2500	950	950	950	950	750

Cleco DIVISION of THE REED ROLLER BIT COMPANY

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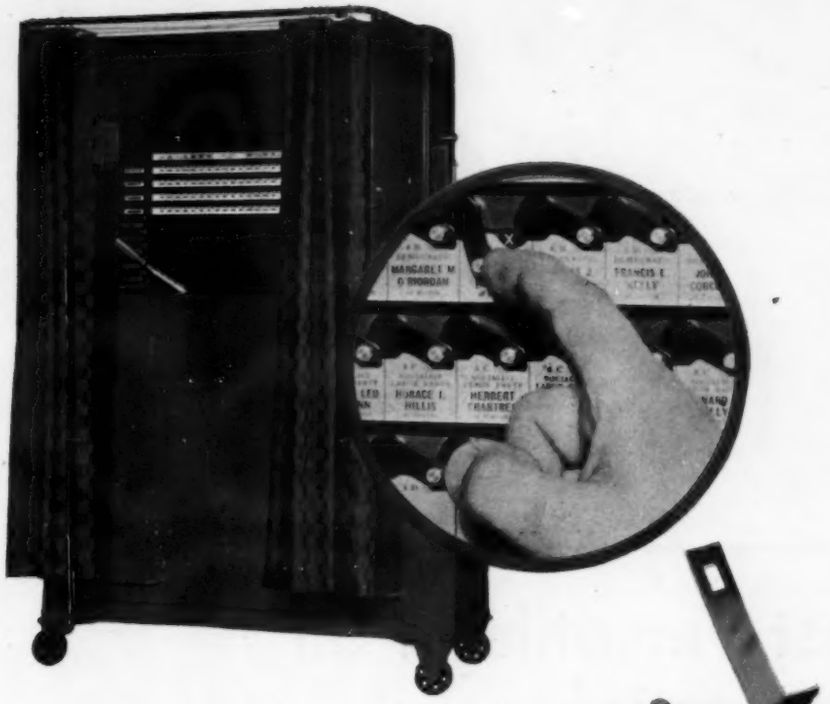


When Brass does the counting your vote is secret and safe

After the candidates have had their say and the orators are hoarse, the *real* voice of America goes to the polls . . . and makes its choice known by means of the secret ballot.

And each year, more of the millions of votes cast are being recorded on automatic voting machines. The vast majority of these are made by the Automatic Voting Machine Corporation of Jamestown, New York.

Fool-proof and fraud-proof, the voting machine is ingeniously designed to meet Election Day problems. Voting is easier, quicker, safer. There are no spoiled or defective ballots. Accurate counts for all candidates are immediately available when the polls close . . . recorded on the registering counters like miles on a speedometer.

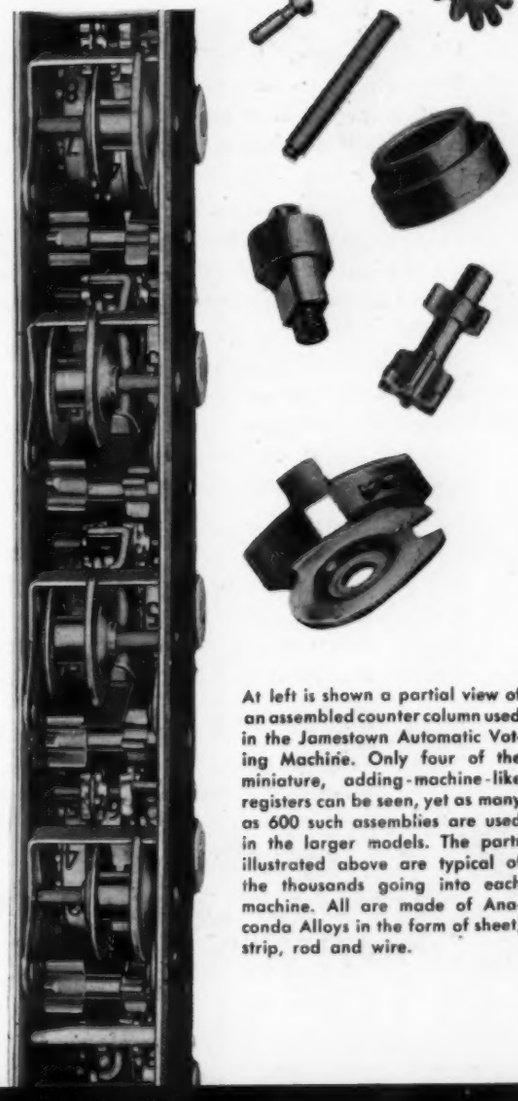
Copper and its alloys play an important part in the dependable operation and long life of the modern voting machine. Between the recording levers on the front, and the registering counters on the back, are hundreds of intricately formed and machined parts of copper, brass and bronze. The American Brass Company supplies these metals in the exacting forms, tempers and compositions most suitable for their use.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

ANACONDA
from mine to consumer

Anaconda
COPPER and BRASS



At left is shown a partial view of an assembled counter column used in the Jamestown Automatic Voting Machine. Only four of the miniature, adding-machine-like registers can be seen, yet as many as 600 such assemblies are used in the larger models. The parts illustrated above are typical of the thousands going into each machine. All are made of Anaconda Alloys in the form of sheet, strip, rod and wire.

Most Versatile of all commercial metals

STRONG • WORKABLE • DURABLE

. . . and good-looking too!

Copper, Brass, Bronze and Nickel Silver have long been known as the most serviceable of all commercial metals . . . yet they rank high among those that can be readily machined, forged, rolled, spun, stamped, pressed, coined, upset or drawn.

While these metals are strong and tough, they are easy on production equipment, too. They can be readily fabricated on standard machines, with added economies through longer life for punches, dies and cutting tools.

Attractive in their own right, Copper, Brass, Bronze and Nickel Silver also serve as a non-rust base for enameled, lacquered, plated or other applied finishes. Products made of these metals are more readily marketable . . . combine longer service life with greater sales appeal.

When ordering Copper, Brass, Bronze, or Special Copper Alloys, specify "Anaconda"—it's your assurance of getting time-tried, dependable metal . . . made by The American Brass Company and unsurpassed in quality and uniformity. 47121

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

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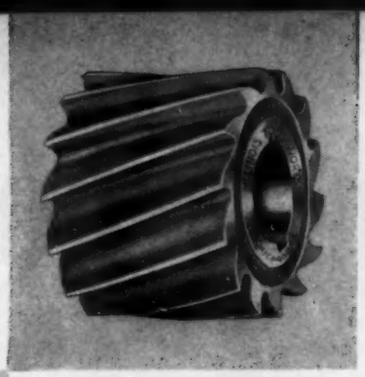
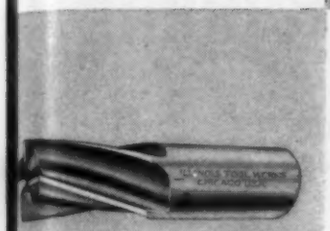
ANACONDA from mine to consumer

Anaconda

COPPER & COPPER ALLOYS

SHEETS • WIRE • ROD • TUBES • SPECIAL SHAPES • DIE PRESSED FORGINGS





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AND SPEED-UP
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cutting tool buying

ORDER FROM A
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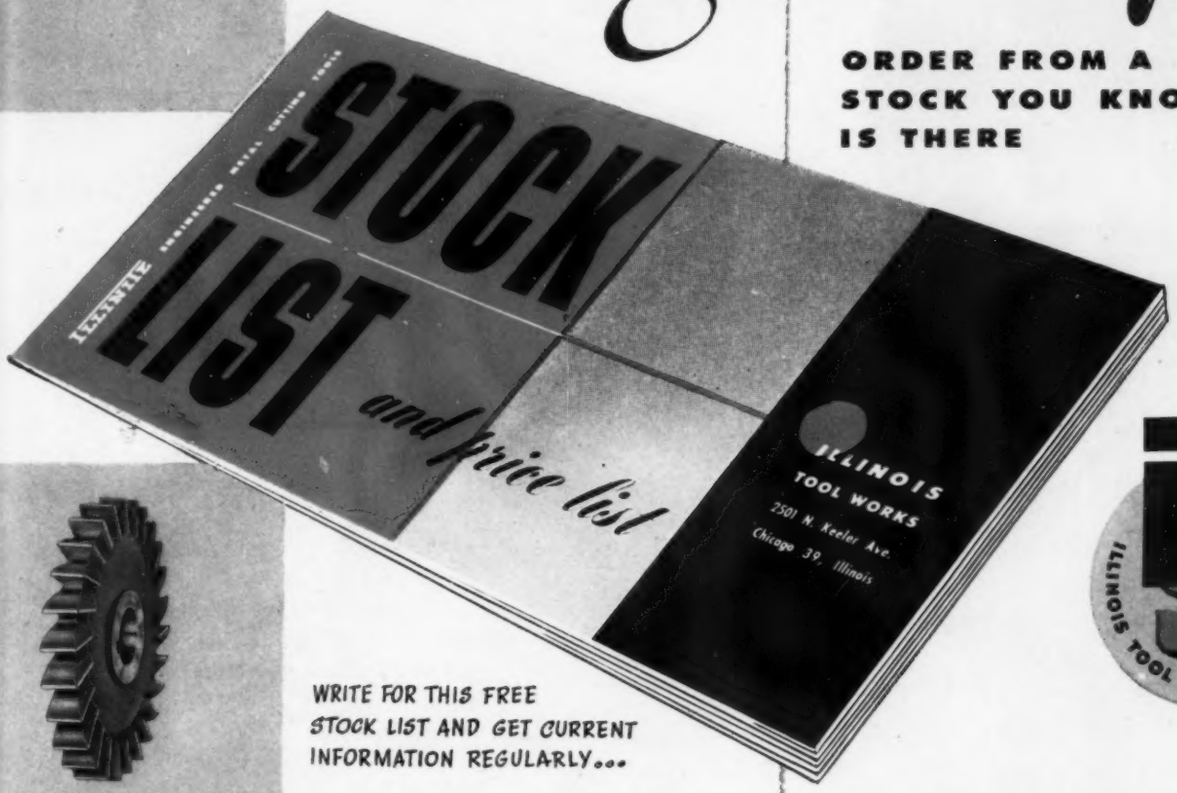
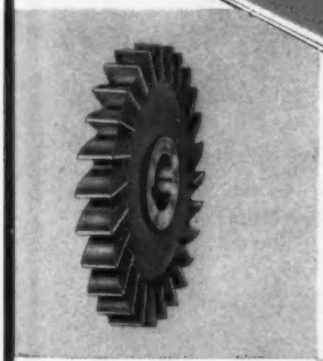
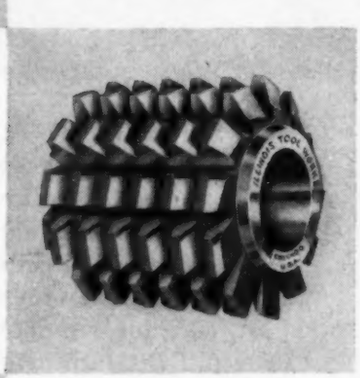
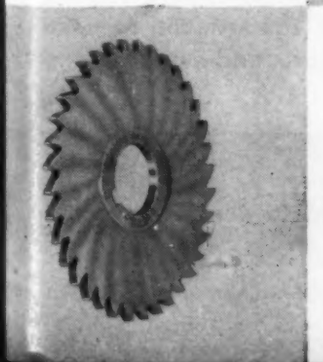
IS THERE





WRITE FOR THIS FREE
STOCK LIST AND GET CURRENT
INFORMATION REGULARLY...





Here for the first time is an unusual service to cutting tool buyers...a complete listing of current information on standard cutting tools carried in Chicago stock for overnight delivery to all America!

It contains complete dimensional data, prices and discounts on standard cutting tools and shows number of tools in stock and which tools are in process at date of issue. Write for your copy today ... and you will receive a *new* issue every other month to simplify and speed your cutting tool orders and delivery. *Write today!*

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TOOL WORKS

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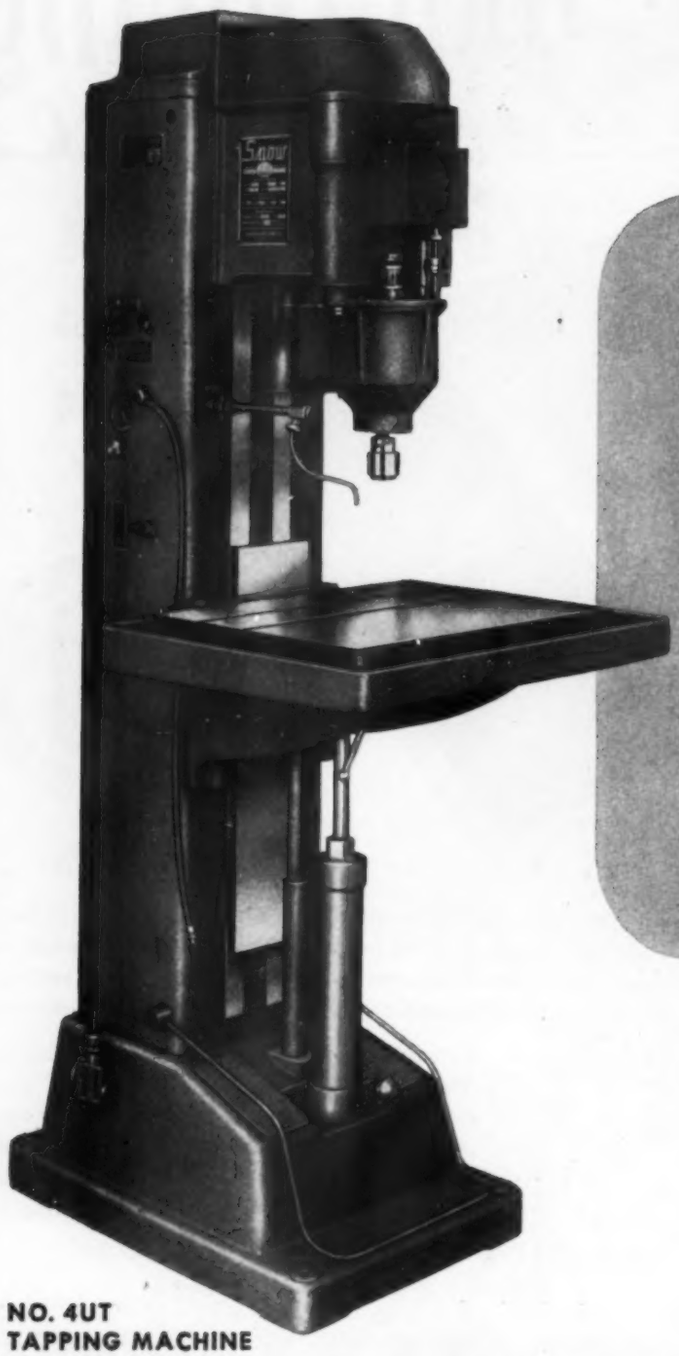
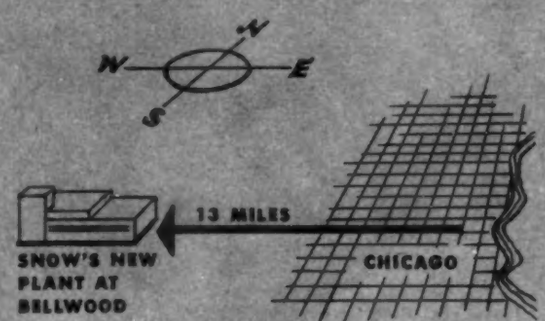
Overnight to All America
From the Hub of Air Transportation

here is the new home

of the snow air-operated tapping,



NO. 4UT
TAPPING MACHINE



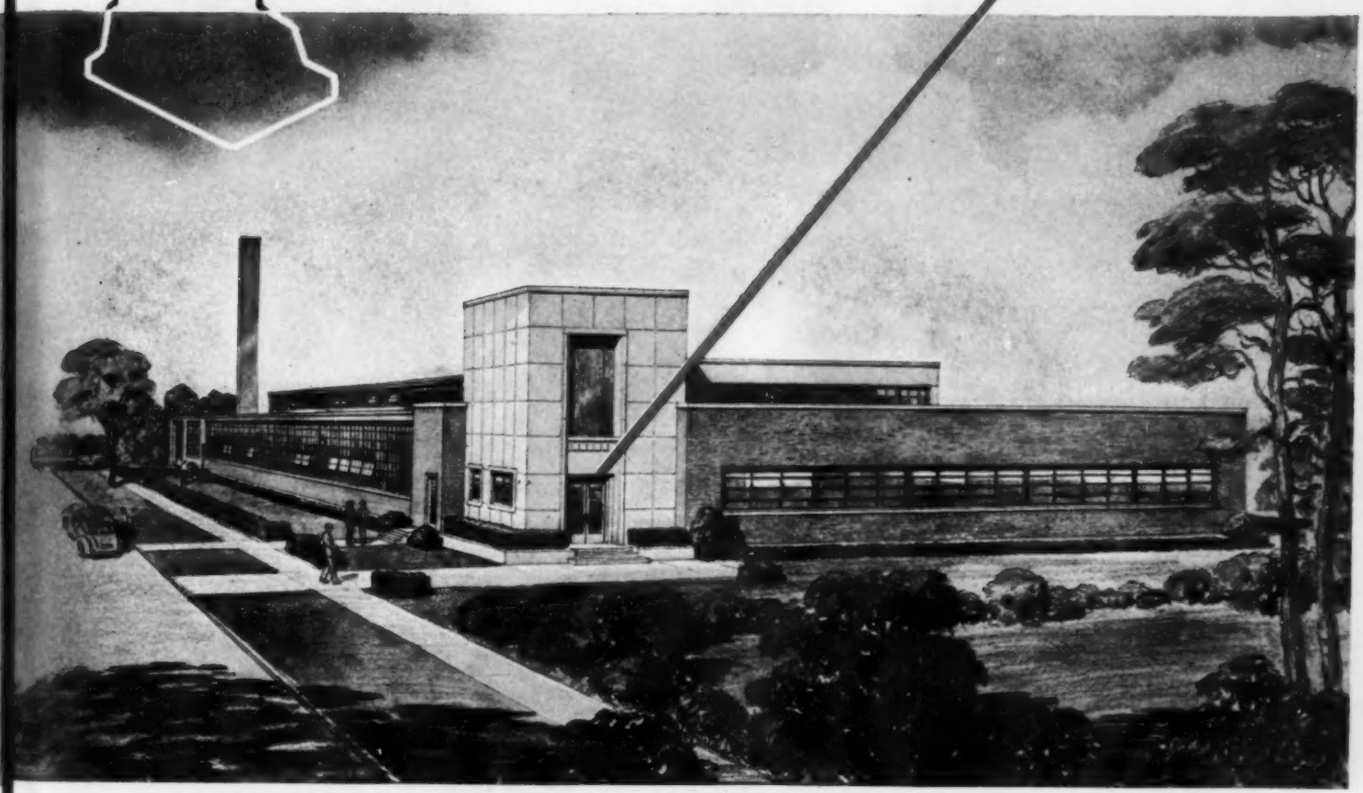
Snow's new plant is located in Bellwood, western suburb of Chicago. Easily reached by Washington Boulevard—main east-west arterial highway—bus and "L" lines practically to the door.

Snow full universal Tapping, Drilling and Threading machines are air-operated, electrically controlled—allow free interchange of any type of holding fixture. For split-second synchronization, sensitivity in feed, accuracy in depth of stroke—for maximum production at low cost, look to Snow.

For full production estimates and tooling data, our engineering department requests that you submit blueprints and sample parts.

AIR-OPERATED, ELECTRICALLY CONTROLLED TAPPING, DRILLING

drilling and threading machines



It's something of an achievement to be recognized as an authority in your field. It's even more of an achievement to gain a reputation for quality and service at the same time. One reason the Snow Manufacturing Company has gained this reputation is its integrated operation—from the drafting table to the finished product. Every step is under direct control.

To maintain this policy, we have erected one of the finest and most up-to-date machine tool plants in the country. It is easily accessible—there is ample parking space. Come out and see us.

Snow

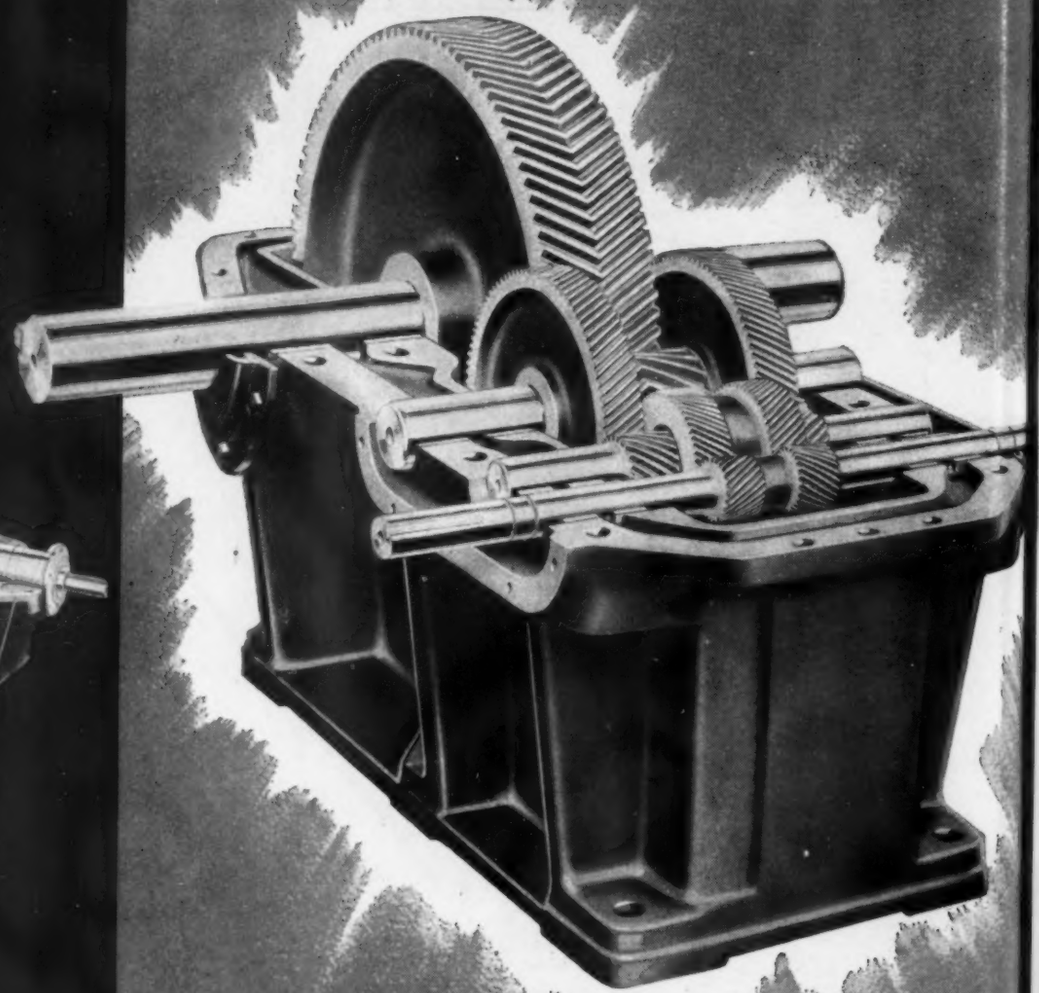
AND THREADING MACHINES

SNOW MANUFACTURING COMPANY
437 EASTERN AVENUE • BELLWOOD, ILL.

FALK Speed Reducers

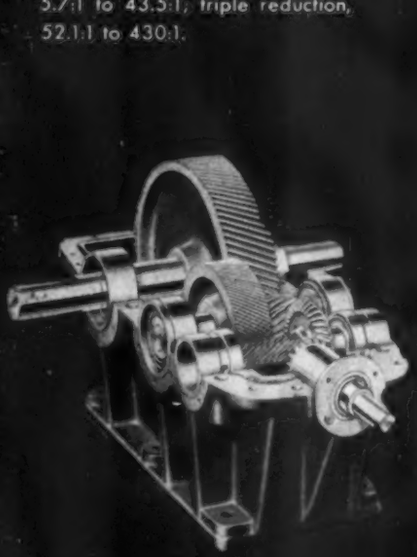
RIGHT (main illustration)

Parallel shaft, herringbone Falk Speed Reducer. Ratios: single reduction, 2.2:1 to 10:1; double reduction, 11.5:1 to 70.2:1; triple reduction, 80:1 to 300:1.



ABOVE

Right angle Falk Speed Reducer with vertical low speed shaft. Available in single reduction units, 1.5:1 to 5.28:1; double reduction, 5.7:1 to 43.5:1; triple reduction, 52.1:1 to 430:1.



ABOVE

Right angle Falk Speed Reducer. Available in single reduction units, 1.50:1 to 5.28:1; double reduction, 5.7:1 to 52.1:1; triple reduction, 56:1 to 515:1.

You Are Entitled to All These Qualities

strength . . . in Falk Speed Reducers is assured by the Falk "know-how" in determining materials, and by special production techniques developed by Falk alone.

rigidity . . . is built into every Falk Speed Reducer. Extra rigidity gives better performance and longer life.

compactness . . . of Falk Speed Reducers is the result of long experience in designing units that provide high efficiency, yet occupy a minimum of space.

simplicity . . . of design, has been achieved by Falk engineers in the development of the complete line of Falk Speed Reducers.

You get them all in every Falk Speed Reducer

THE FALK CORPORATION, Milwaukee 8 Wisconsin

Precision manufacturers of Speed Reducers . . . Flexible Couplings . . . Motoreducers . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work. District Offices, Representatives, or Distributors in principal cities.

s—Designed to Fit the Job!

WHATEVER your speed reducer problems or requirements, it is good business judgment to consult Falk first.

Today's line of Falk Speed Reducers is the culmination of more than a half-century of experience in metallurgy, gear design and the production of the highest quality power transmission equipment.

Falk Speed Reducers are available in many styles, types, ratios and capacities . . . they are the choice throughout industry because of their suitability to a wide range of requirements. There are many models . . . built in parallel, vertical and horizontal right angle types, with single, double and triple reduction ratios. Efficiencies of 96% to 98½% at full load are attained through special Falk techniques of design and construction. Balanced performance is assured . . . longer gear life . . . smooth-running operation. Every Falk gear, herringbone or single helical type, is precision made . . . the patented lubrication system provides increased efficiency. Parts are interchangeable.

Each Falk Speed Reducer is built to give long and trouble-free service . . . to be dependable and efficient under all working conditions in all types of service . . . and to represent the long-range economy sought by the careful buyer.

Throughout industry . . . from power to production, it's . . .

FALK a good name in industry!

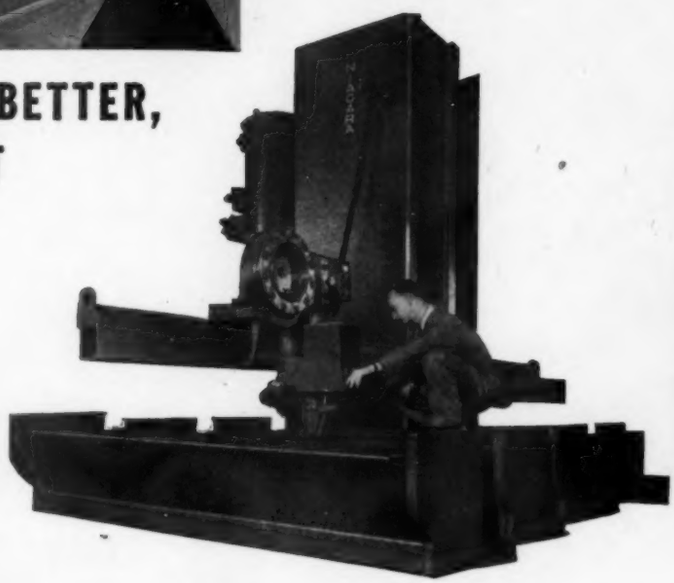
THE FALK CORPORATION • Milwaukee 8 Wisconsin • Established 1892

YOU CAN NOW WELD THEM BETTER, FASTER AND AT LOWER COST

with this new

NIAGARA *Electronic*

Automatic Welding Machine



High welding current, fast welding, less passes per seam, deep penetration, silvery uniform bead, minimum distortion, easy one-man operation,—you get all these advantages and economies with this new Niagara Electronic Automatic Welding Machine. Write for new Bulletin 83 for the facts.

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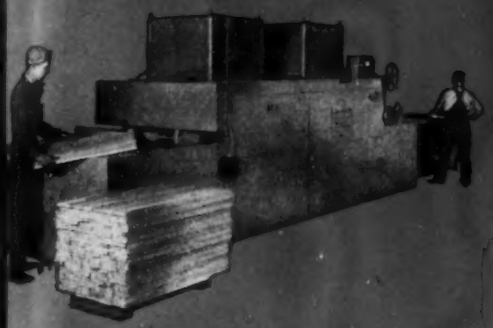
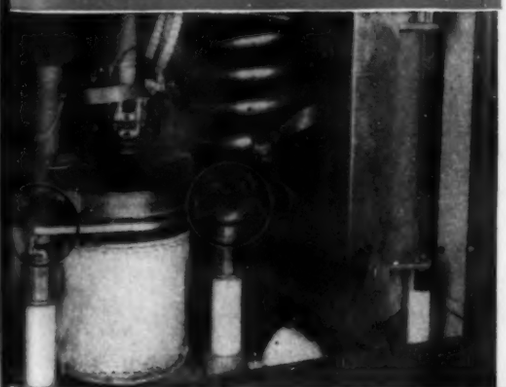
GIRDLER *Isolates Blower* VIBRATION *with* LORD VIBRATION CONTROL SYSTEM



Above—Thermex Model 10-H high frequency heat generator used for high speed wood-glue bonding. Lord Mountings isolate blower vibration from sensitive equipment.

Below—Lord Vibration Control System in Thermex Model 10-H also includes Mountings for oscillator tube. Complete protection prolongs tube life—cuts operating costs.



***LORD** Mountings Used by The Girdler Corporation in Thermex High Frequency Heating Equipment to Isolate Blower Vibration—Protect Oscillator Tube—For Greater Efficiency, Service Life . . .*

Greater efficiency—longer service life—smooth, quiet performance are obtained in Thermex high frequency heating units by thorough isolation of vibration. Protection of sensitive electronic equipment from vibration is so important that The Girdler Corporation, Thermex Div., specifies a *complete* Lord Vibration Control System in their product.

The Lord Vibration Control System in this Thermex unit provides two-way protection . . . first, by isolating blower vibration, and secondly—for complete protection—isolating the sensitive oscillator tube from external vibratory disturbances. Four Lord Shear-Type Bonded-Rubber Mountings under the blower and motor assembly prevent its vibration from damaging the oscillator tube. Three more Lord Mountings support the oscillator tube, effectively guarding it against shock and vibration from nearby machinery.

Whether you manufacture electronic equipment or any other product, you can increase your sales by eliminating costly, destructive vibration. It will pay you to consult Lord . . . make us your headquarters for product improvement through Lord Vibration Control Systems.

LORD

MAKE GOOD PRODUCTS BETTER
with *Vibration Control*

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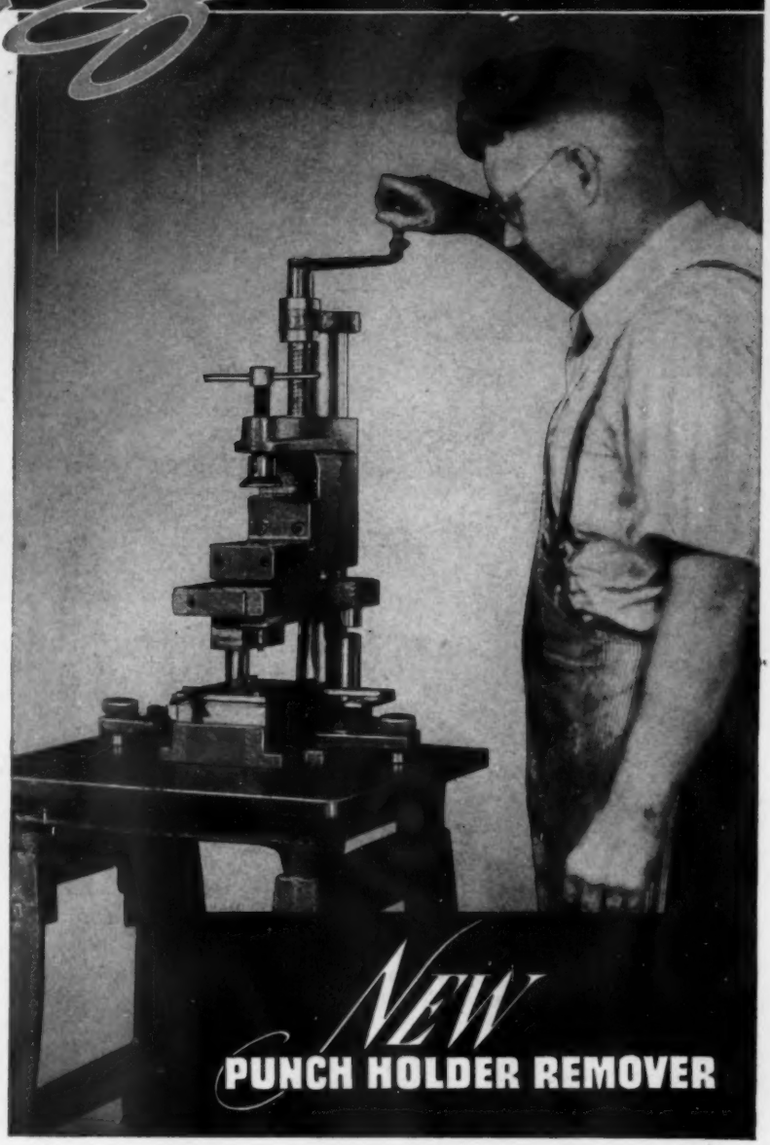
Canadian Representative: Railway & Power Engineering Corp., Ltd.

947

A PRODUCTO TIMELY COST CUTTING AID



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No need to waste valuable diemakers' time . . . or endanger expensive punches and dies. The *New* PRODUCTO PUNCH HOLDER REMOVER does the job with the efficiency to be expected from a machine built for a specific use.

You can easily and quickly remove punch holder from die bed with guide pins . . . or separate assembled punches and dies with perfect safety to all units. Die sets, with or without shank, are equally well handled.

Furthermore, shearing in small punches and dies, and tryout work on lighter material give you added uses of this machine.

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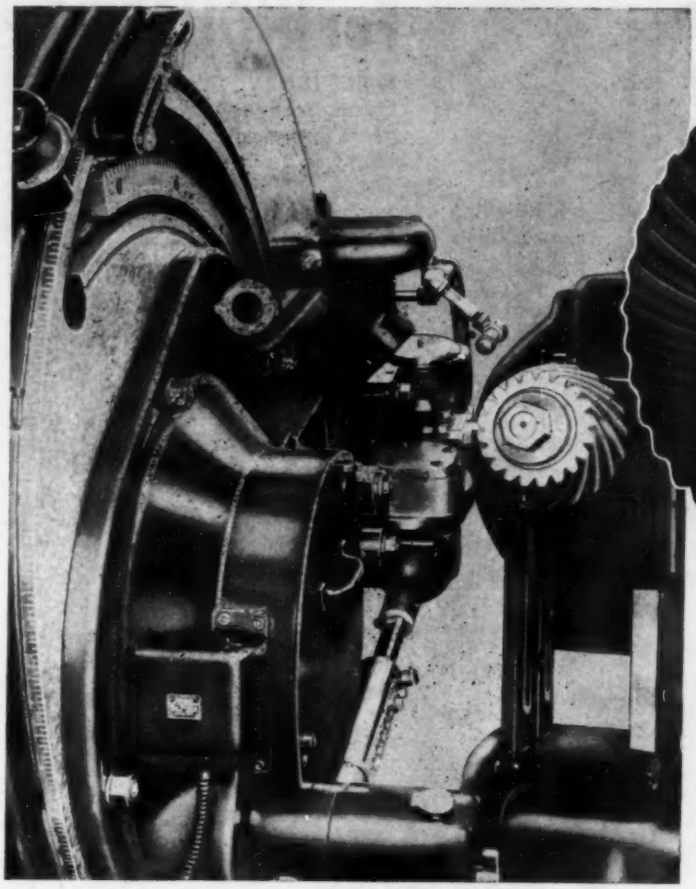
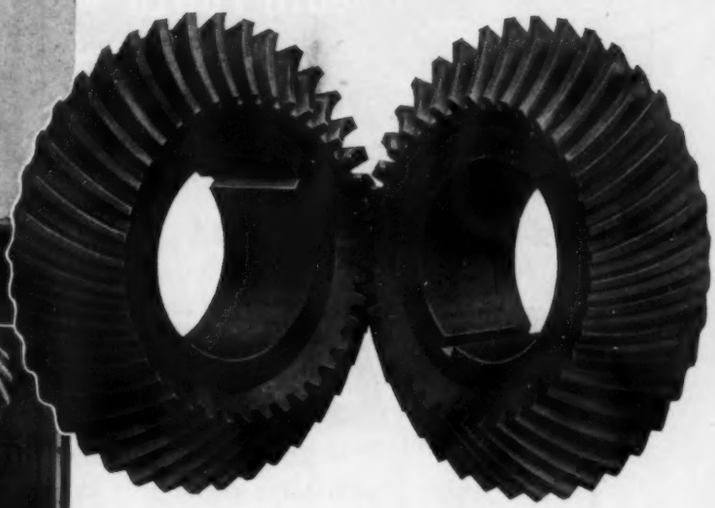
Curved Tooth Spiral Bevels

A *VERY GOOD COMBINATION* OF GEARS





Above is shown a close-up of pinion on our 48" Spiral-Bevel Gleason Gear Generator; while at right (above) is a typical pair of curved tooth Spiral-Bevel Gears on one of our 18" capacity machines.

. . . for smoothness, quietness, efficiency, strength & durability

. . . FOR SHAFTS OPERATING AT ANY ANGLE

Unequaled for *high ratio, high speed* drives where gear sizes must be kept to a minimum, Spiral-Bevels are the ideal combination for power transmission between shafts at *any angle and speed*. Actually, the unsurpassed performance of Spiral-Bevels and Hypoids result largely from the curvature and obliquity of teeth—assuring continuous pitch line contact and an overlapping action, which allows at least two pairs of teeth in contact at all times—smooth transfer of load from tooth to tooth (without noise and vibration), and increased load carrying capacity, due to the distribution of load over a greater number of teeth.

Large Spiral-Bevels and Hypoids, when required, have their teeth (only) hardened on our own surface hardening machine—while smaller gears, where necessary, are hardened by the induction straight heat-treating or case-hardening methods.

Hypoid Gears are similar to Spiral-Bevels, but have the pinion axis above or below center of gear axis—and they run even more accurately and smoothly than Spiral-Bevels. Incidentally, both Spiral-Bevels and Hypoids give *localized tooth bearing*, which decreases stress, greatly lengthens gear life, and minimizes breakage.

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SPIRAL BEVEL GEARS—Made from 1" to 30" in diam. and 24 DP to 1½ DP.
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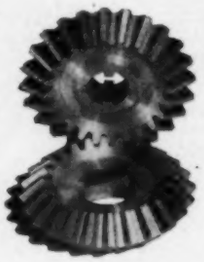

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All Cincinnati Spiral Bevel Gears are cut, tested, matched, lapped and marked in individual sets . . . to insure correct bearing location on teeth.

For smooth, efficient operation at high speeds . . . specify Cincinnati Gears, *Good Gears Only!*

THE CINCINNATI GEAR COMPANY

"Gears . . . Good Gears Only"

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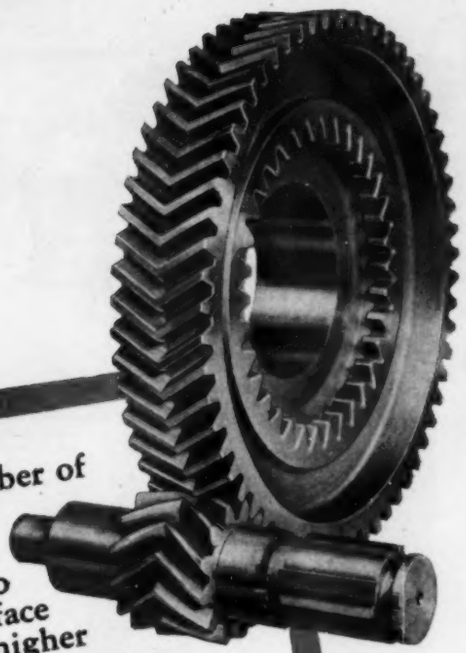
WHY machine tool gears need BACKBONES



The Farrel-Sykes *Gear with a Backbone* has a number of outstanding advantages for machine tool applications.

The *backbone*, formed by the juncture of the two helices without a center groove, puts the entire face width to work, providing extra strength and higher load-carrying capacity in small space—a definite advantage for "designed-in" gears.

Generation by the famous Farrel-Sykes method makes these gears extremely accurate and exceptionally quiet and smooth-running. The combined characteristics of overlap or interlacing of the teeth, gradual tooth engagement and inclined line of pressure reduce wear and maintain the involute profile and correct tooth action throughout a long gear life.

These and other features of design and manufacture contribute to dependable performance, continuous operating efficiency and maintenance economy.

Farrel-Sykes gears are made in any size up to 20 feet in diameter, for almost any application. Information and engineering assistance available without obligation.

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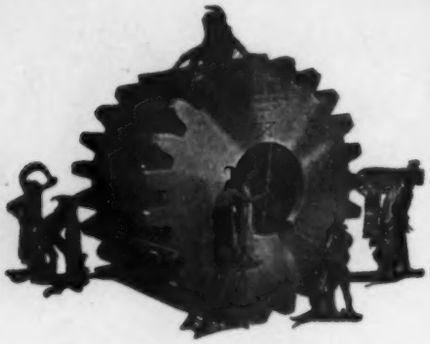
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

FARREL
The Gear with a Backbone

Farrel-Birmingham

FB-422



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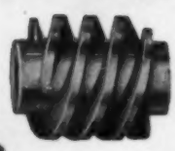
"HARTFORD" for Gears, Cams, Thread-Grinding



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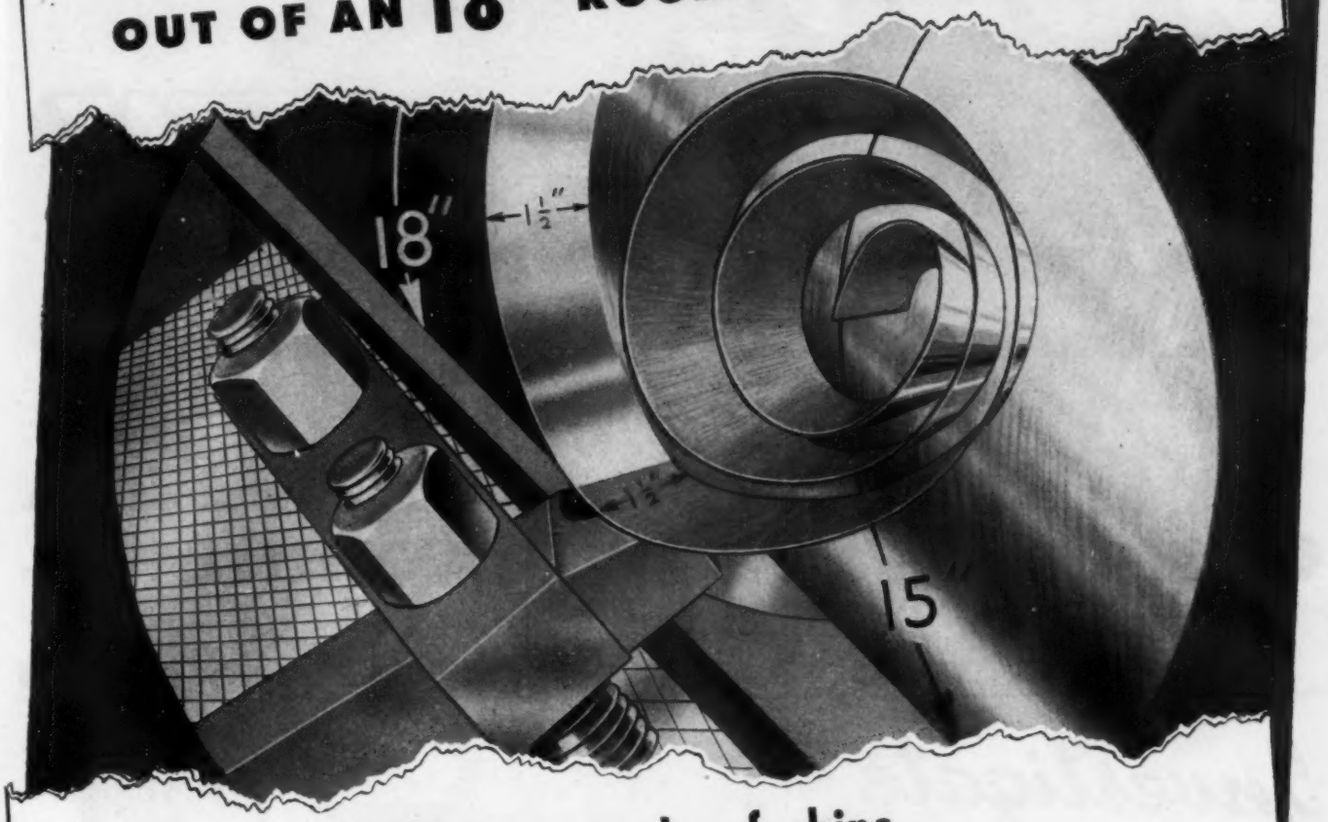
HOW TO MAKE A 15" ROUND OUT OF AN 18" ROUND IN *ONE CUT!*



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DEPTH OF CUT	1½"
FEED PER REVOLUTION	0.044"
CUTTING SPEED	197 feet per minute
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High-Speed Steel Tools, Cutters, Broaches, etc., of molybdenum, tungsten and cobalt are given longer useful life when hardened the Sentry Way with the Sentry Diamond Block Method of controlled atmosphere. Advantages are maximum hardness, uniform quality, no scale, no decarburization, bright finish, dimensions and shape maintained and finishing operations eliminated. One unskilled operator can tend several furnaces.

Sentry Electric Furnaces are quick to heat, economical to operate, flexible, clean. There are horizontal and vertical models in sizes to meet your needs.

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Performance!

★TALIDE METAL MEETS EVERY REQUIREMENT★

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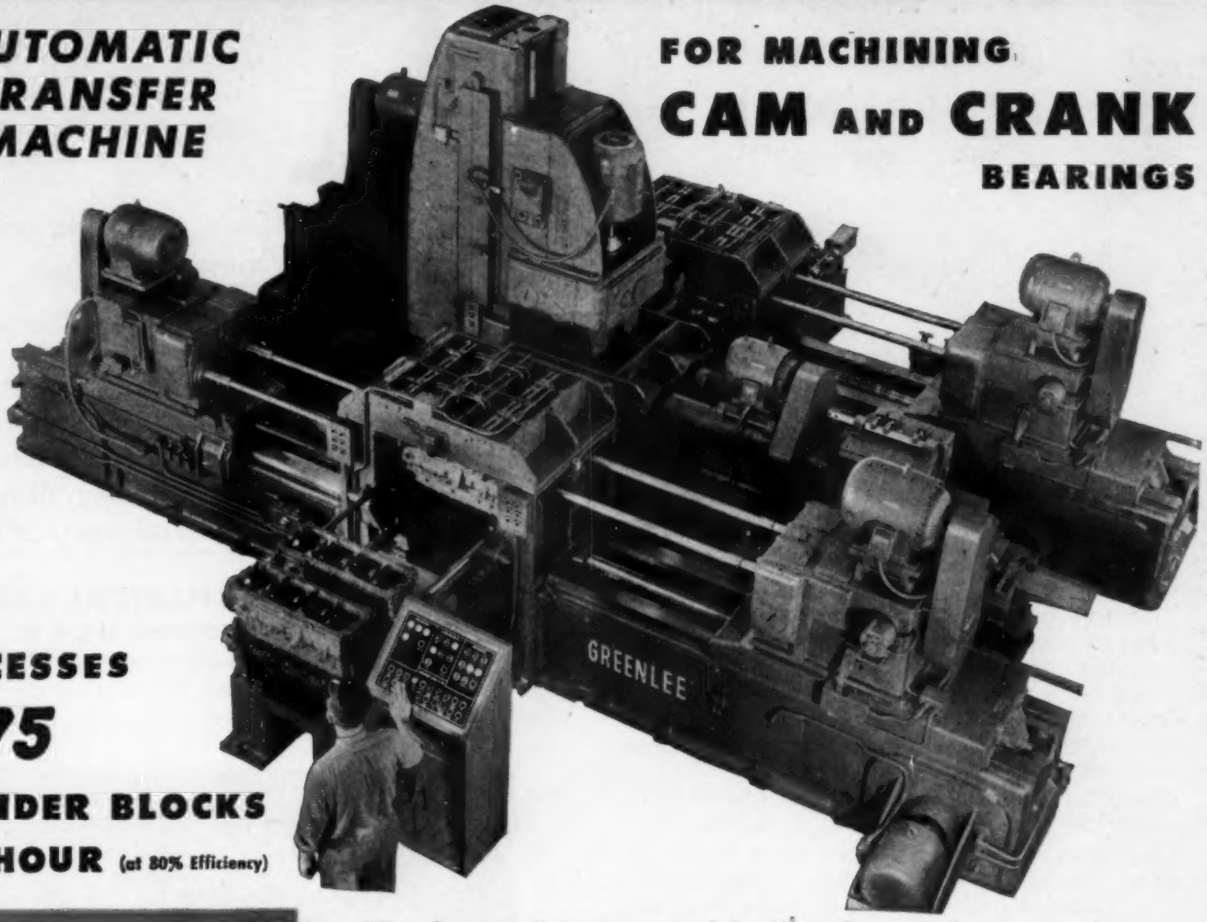
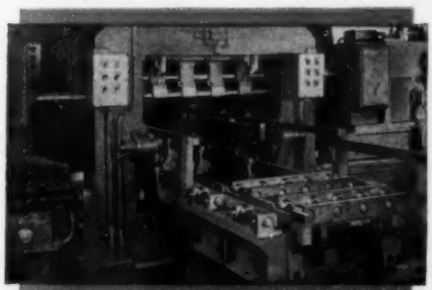
AUTOMATIC TRANSFER MACHINE

FOR MACHINING CAM AND CRANK BEARINGS



PROCESSES 75 CYLINDER BLOCKS PER HOUR (at 80% Efficiency)



The loading end of the machine, boring bars in working position. The tool bits automatically position and clear through keyways in the bearings when the bars advance and retract.

The loading end with blocks in position, boring bars retracted. The blocks are raised to working position automatically and are clamped by the pan rail against locating pads.

Here is one of the newest of the line of cost-saving automatic transfer-type machines pioneered and built by Greenlee during the last 12 years. In addition to rough and finish boring the camshaft and crankshaft bearings on 8-cylinder engine blocks, it also performs some important milling and grooving operations. The cycle of the machine is entirely automatic; the operator simply slides two blocks into the loading position and presses a starting button. Blocks travel along the transfer bar in pairs, and the sequence of operations is: (1) Semi-finish bore camshaft and crankshaft bearings, (2) Straddle mill center bearings and cut cork and oil grooves, (3) Finish bore camshaft and crankshaft bearings, (4) Automatically unload. Chips are carried away by a slat conveyor. All bearings and boring bars are automatically lubricated. A master control board insures correct functioning of all units. The machine is designed to produce 75 pieces per hour at 80% efficiency.

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MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

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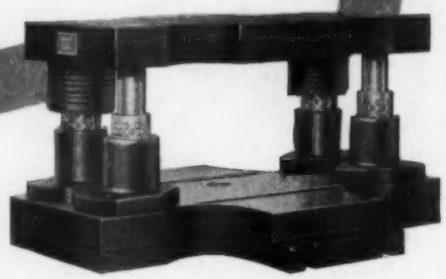

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These precision sets guarantee perfect alignment of punches and dies. Pre-loaded anti-friction bearings between leader pins and bushings never allow the slightest play; they prevent any lateral motion or tilting of the punch holder, so that punch and die engage squarely every time. Clearance between cut edges is maintained. Chipping of edges is eliminated. You obtain more production per grind and longer die life.

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Lempco Anti-Friction Die Sets can be made in any shape or style. Take a minute NOW to learn more about them. Just drop us a card. You'll have your fully-illustrated catalog by return mail.

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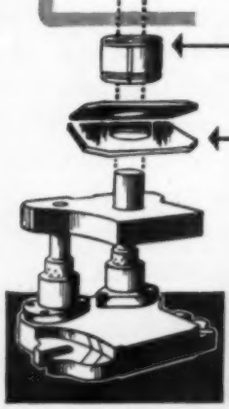

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eliminate perpendicular misalignment between shank clamp bushing and die set.

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automatically correct punch press misalignment, front to back, left to right, or diagonal. Matched spherical plates, machined and cadmium plated for long life.

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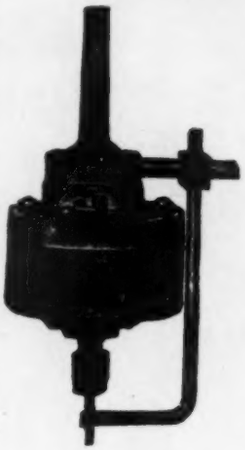

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Ball & Bronze bearing throughout.

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Also: Multiple drilling & tapping attachments, auto opening dieheads, clutch tappers to 2″ taps.

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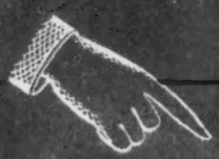
GAGE BLOCKS

FIRST QUALITY

HIGH SPEED STEELS



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Manufacturers of FIRST QUALITY TOOL and DIE STEELS —*exclusively*

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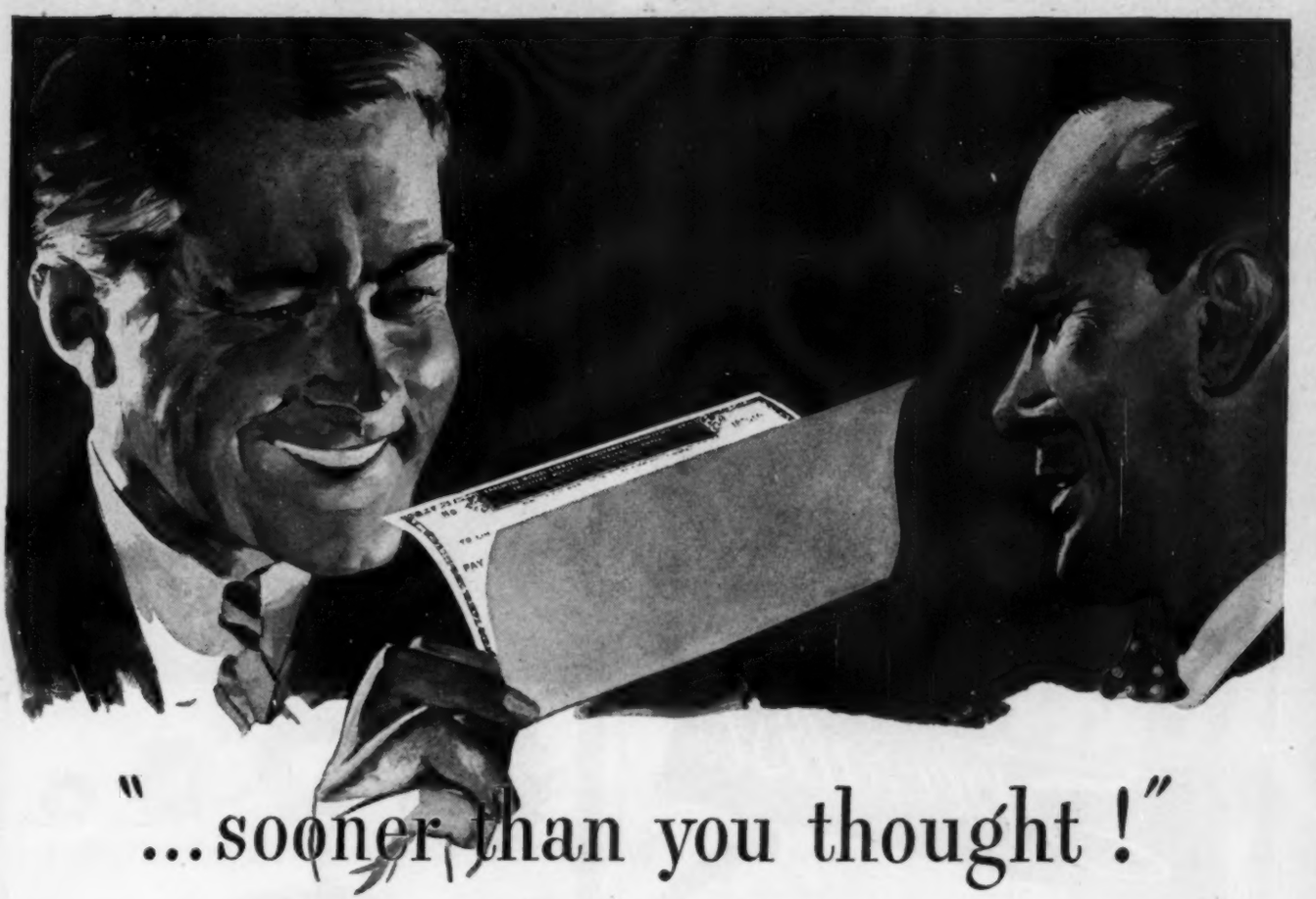

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PLUG THREAD GAGES
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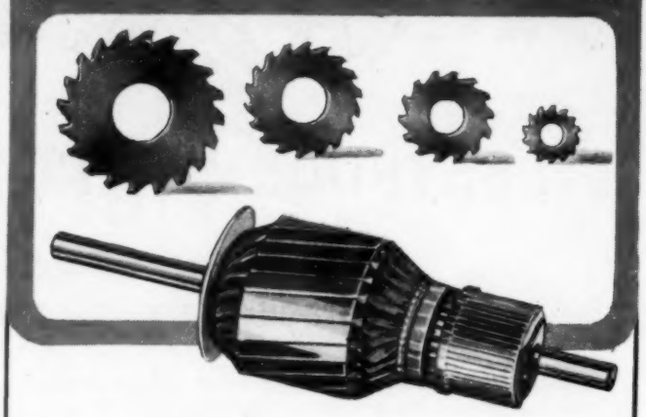
CIRCLE ® *Solid Tungsten Carbide* COMMUTATOR SLOTTING SAWS "U" Type



INCREASE PRODUCTION *25 to 80 Times* over High Speed Steel Saws

Commutator slotting saws are made in diameters from 3/16" to 1 3/16", and from .010" to .045" thick. They operate at 5,000 to 6,000 R.P.M. and assure better work at these greater speeds! Complete price information availaible on request.

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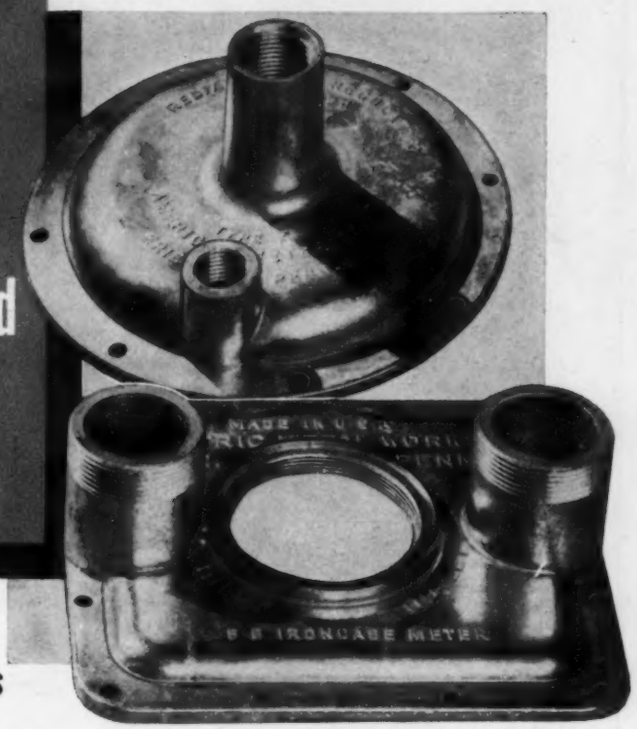
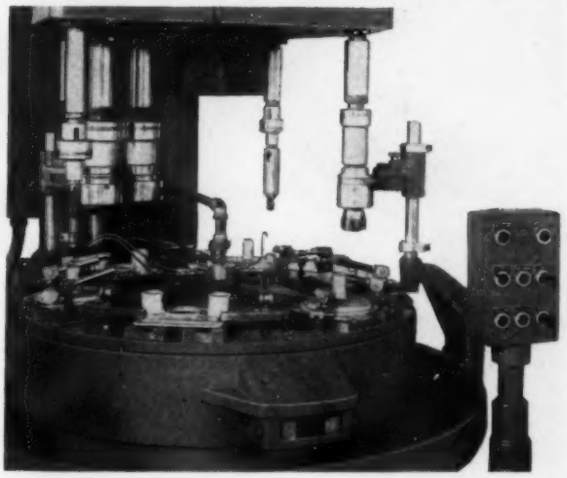
1 MACHINE for
2 DIFFERENT PARTS with
3 DIFFERENT OPERATIONS and
4 DIFFERENT SIZES

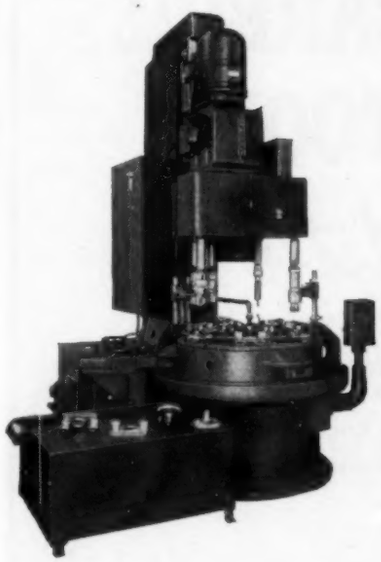


▲ Two Different Meter Parts, requiring Threaded and Tapped Diameters of Separate Lengths and Size, Machined Simultaneously on BARNESDRIL No. 5 Vertical Hydraulic Unit-Type Machine.

5 Separate Thread Diameters Finish-Machined in One Operation on BARNESDRIL Vertical Hydraulic Unit-Type Machine

The problem of multiple handling and machining these meter parts was reduced to one automatic operation on a BARNESDRIL Hydraulic Unit-Type Machine. Five different diameters are threaded and tapped simultaneously in a fully automatic machine cycle requiring only 40 seconds for completion. Operator simply loads and unloads pieces at the end of each cycle. As a result cost per piece is greatle reduced, operator efficiency increased, and a total production of 150 pieces per hour (75 of each) is obtained.





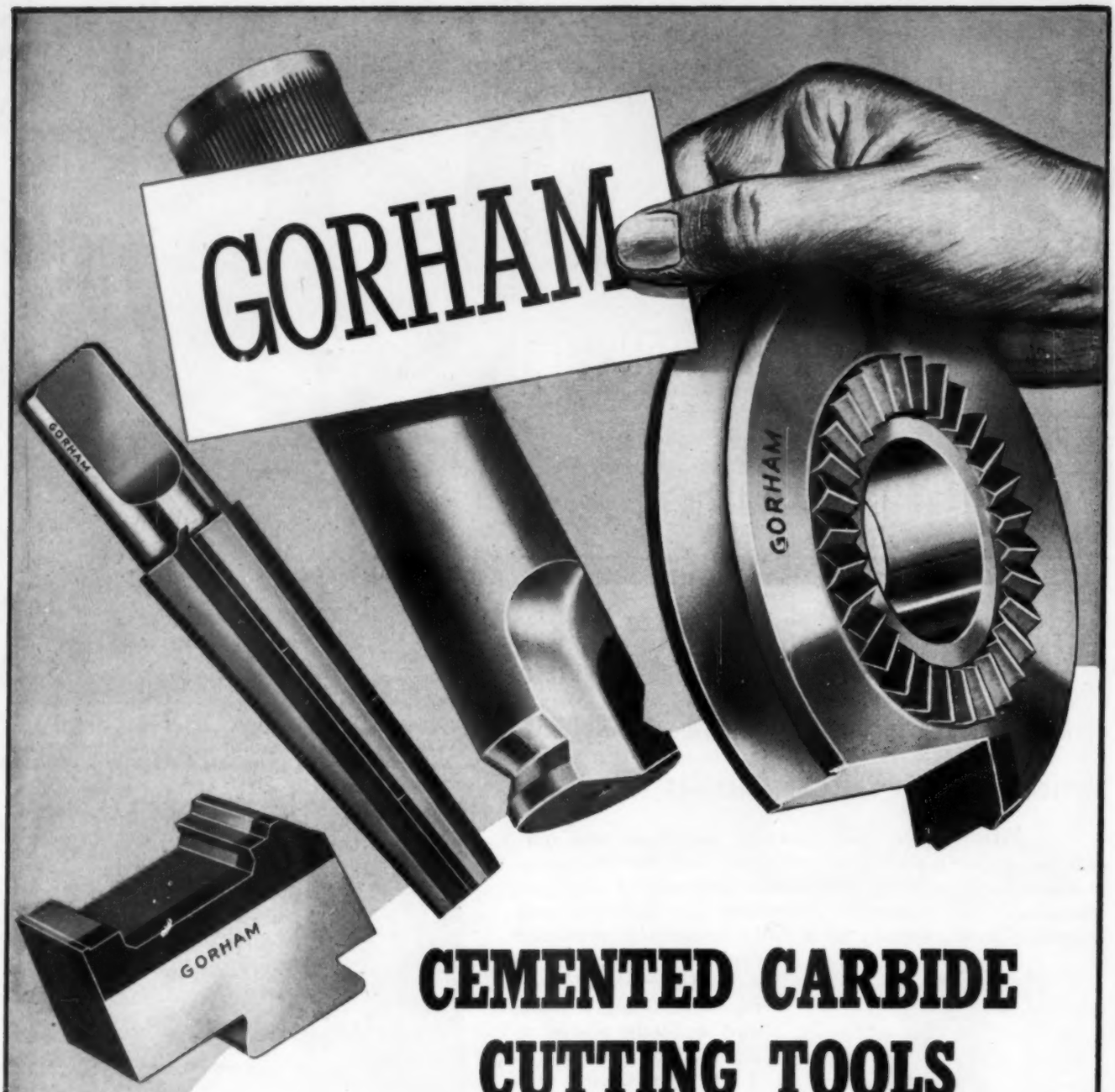
BARNESDRIL Hydraulic Production Units are adaptable to a large number of drilling, reaming, tapping, threading, facing, counterboring and milling operations with similar efficiency and savings. Consult your BARNESDRIL Representative for details on application to your machining problems.

SEND for copies of new bulletins describing Hydraulic Units and Special Tooling and Fixtures. Ask for Bulletins B-1504 and B-34.

SEE THESE MACHINES IN OPERATION AT OUR BOOTH NO. 42, NATIONAL MACHINE TOOL SHOW, CHICAGO, SEPTEMBER 17-26

BARNES DRILL CO.

830 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.



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★ 3/4" Width 10-Tooth Blades
★ 3/4" Width 12-Tooth Blades

Discontinued during the war in line with governmental simplification regulations, these Hard Edge Flexible Band Saws are now back again as *standard, regularly stocked Barnes items.* Their worth has been proven on all standard horizontal type saws including Johnson, Wells, Kalamazoo, etc., as well as on standard vertical type machines. These blades:

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Available in coils or cut to designated lengths and welded. Your Distributor has both these new "Krimp Set" Band Saws NOW. Order them—try them for greater band sawing efficiency.

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*"KRIMP SET" is Barnes designation for "Wavy Set"

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JOMACS OUTWEAR ORDINARY WORK GLOVES BY AS MUCH AS 700%... SHOP RECORDS PROVE IT!

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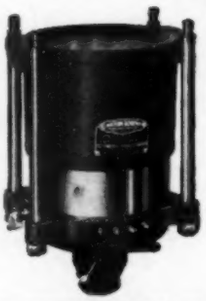

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Self-contained unit, quickly installed on any punch press.

Furnished with hardened and ground pin pressure pad.

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5"	6"	8"	10"	12"	14"	16"
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FASTER DRAWS, DEEPER DRAWS

Two of the important advantages of BONDERIZING as an aid in drawing

Above: Seamless steel tubes [illegible] from Bonderizing [illegible] drawing.

Right: Bonderized [illegible] percentage of reduction in this cold drawing operation.
(Photos, courtesy Ohio Seamless Tube Co.)

More feet per minute, greater percentage of reduction per draw—this is what Bonderizing as an aid in drawing has accomplished for seamless steel tube manufacturers.

Bonderizing has three main actions in aiding the drawing of metal: Its great affinity for oil retains lubricant even under great pressures. It acts as a cushion between work and dies. Being nonmetallic, it greatly reduces galling, scoring and welding.

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Bonderizing as an aid in drawing can save you time, money, and tools!

FREE TECHNICAL BULLETIN

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★ 4 BIG REASONS WHY

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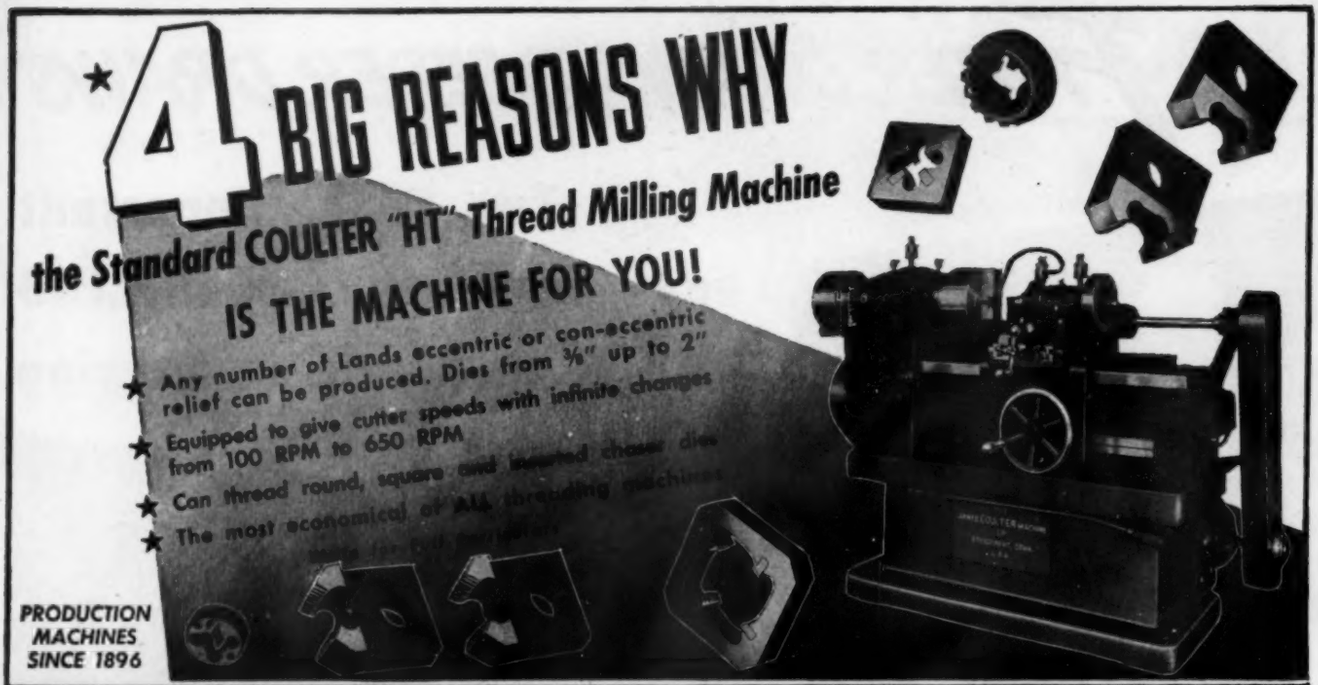
★ Equipped to give cutter speeds with infinite changes from 100 RPM to 650 RPM

★ Can thread round, square and inserted chaser dies

★ The most economical of ALL threading machines



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This is more than incidental improvement . . . it means that every Sheldon TRB S-56 can do accurate precision work, at new high machining speed and maintain its extreme accuracy—can produce more and at lower cost per piece.

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From any angle this "tomorrow's lathe" is your best buy today.

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Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

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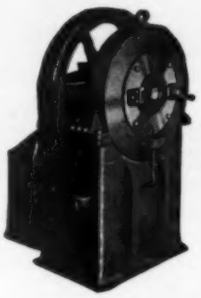

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This was a *real* "problem" job, but the Carmet-insert draw die above solved it. It not only turned out 50% more stainless steel parts per day, all perfect compared with considerable spoilage before . . . it also produced 50,000 parts, *with no re-working*, compared to less than 1000 parts for the total life of the die it replaced. Remarkable, yes—but you can always expect unusual results from Carmet-edged tools on drawing, blanking or cutting operations, or from Carmet machine parts where great wear-resistance is required. ● Just remember, in addition to the regular line of Carmet cutting tools, we specialize in preforming tipped carbides to practically any specification—supplying them either "as

Fast, Accurate Production

More Economically

with the New

No. 50

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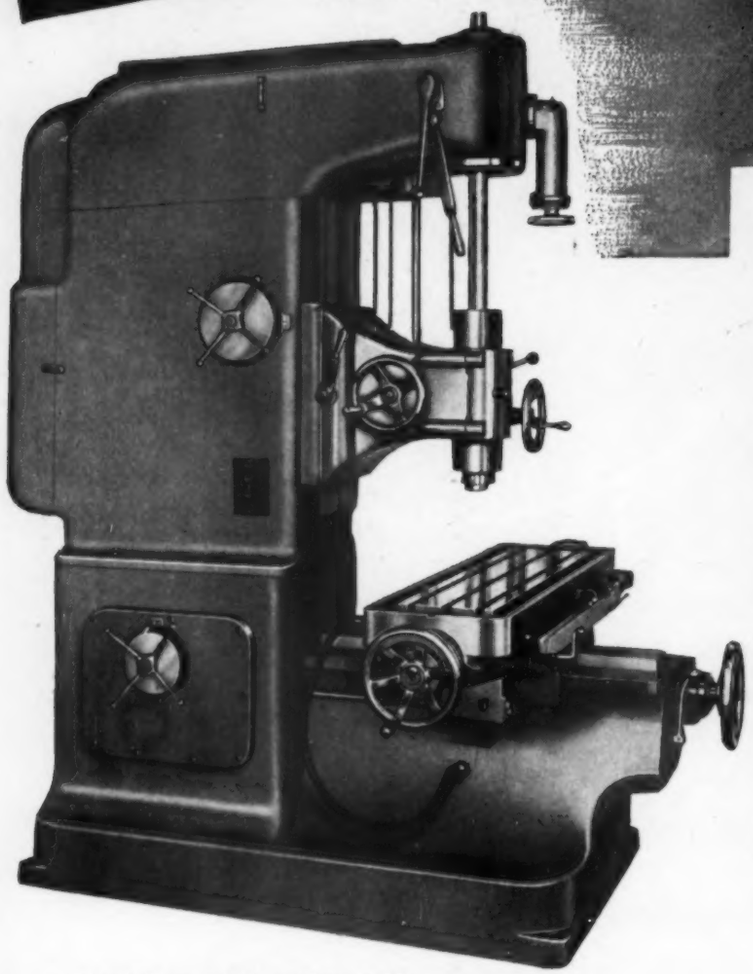

The unusual production economy of the new Knight No. 50 is achieved by combining, in a single solid base machine of exceptional range, all the features required for both precision boring and vertical milling. The elimination of time-wasting extra setups and transfers of work save costly labor and make possible much higher output at far lower costs. With a working capacity of greater range than other machines of comparable size, there is also power to spare in the rugged No. 50 for easily and speedily handling the toughest jobs in any shop.

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- *100" per minute table traverse, both directions*
- *16 Table feeds, 5/16" to 20" per minute*
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PLENTY, if you're looking for proof how a product, in a highly competitive market, can be given the advantages of aluminum at little or no increase in cost.

This new prefabricated farm and utility building is all-aluminum inside and out, never requires paint, is fire and vermin proof. The common assumption would be that its price is "out of this world" compared to steel. Actually, there's little or no difference in the final erected cost.

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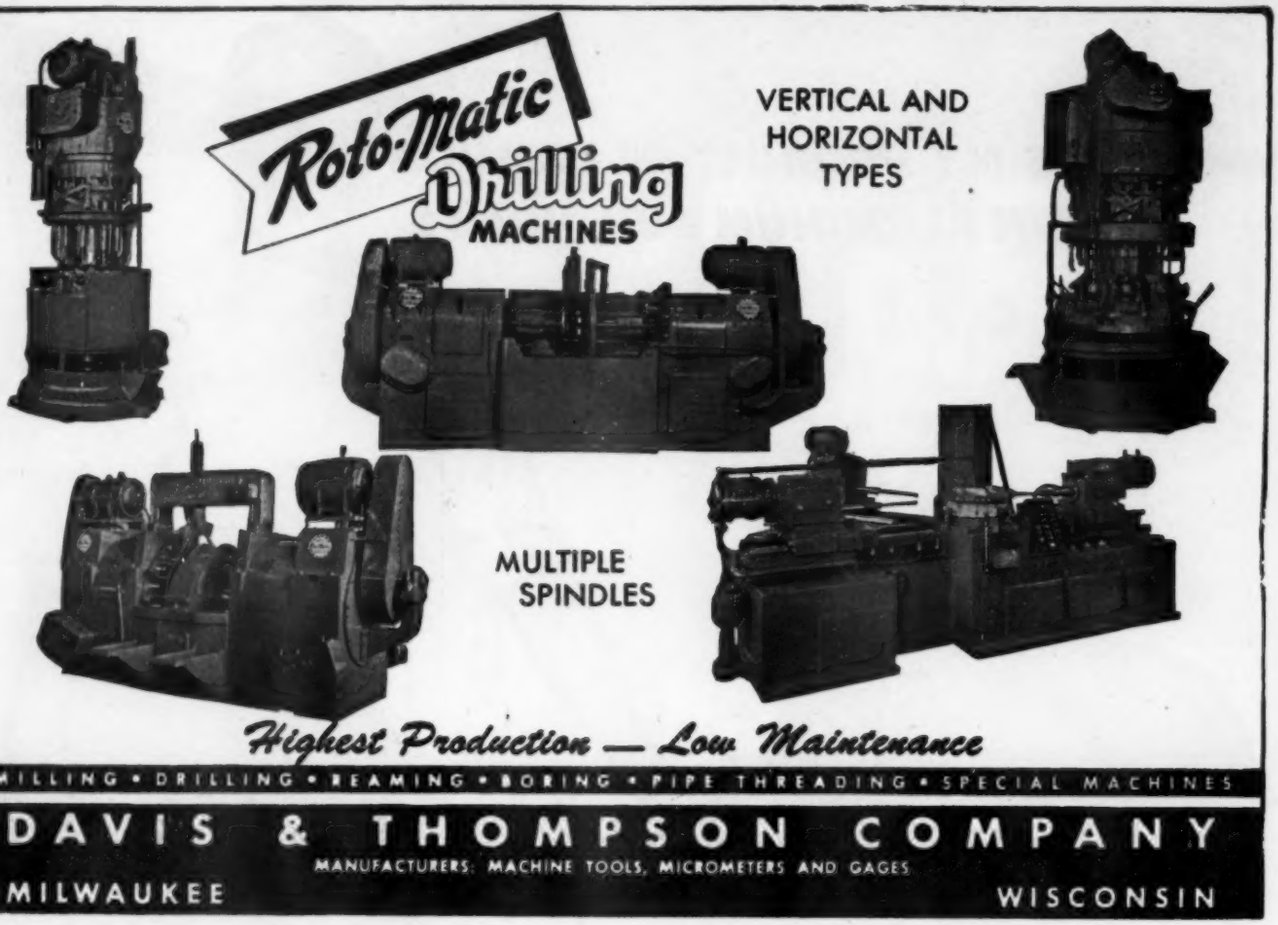

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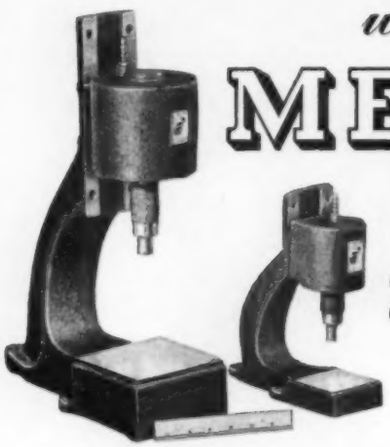
MEAD AIR PRESS



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in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

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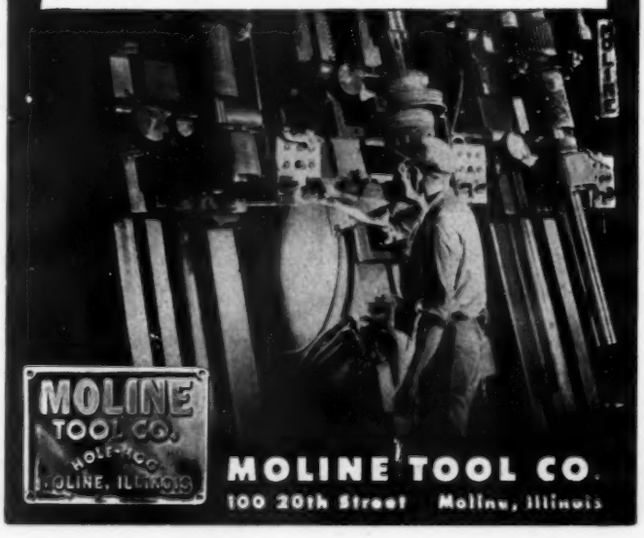
then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

For YOUR special problem, go "HOLE-HOG," write us for any information you may need.



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GTD Greenfield 75th YEAR

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The GEOMETRIC TOOL COMPANY
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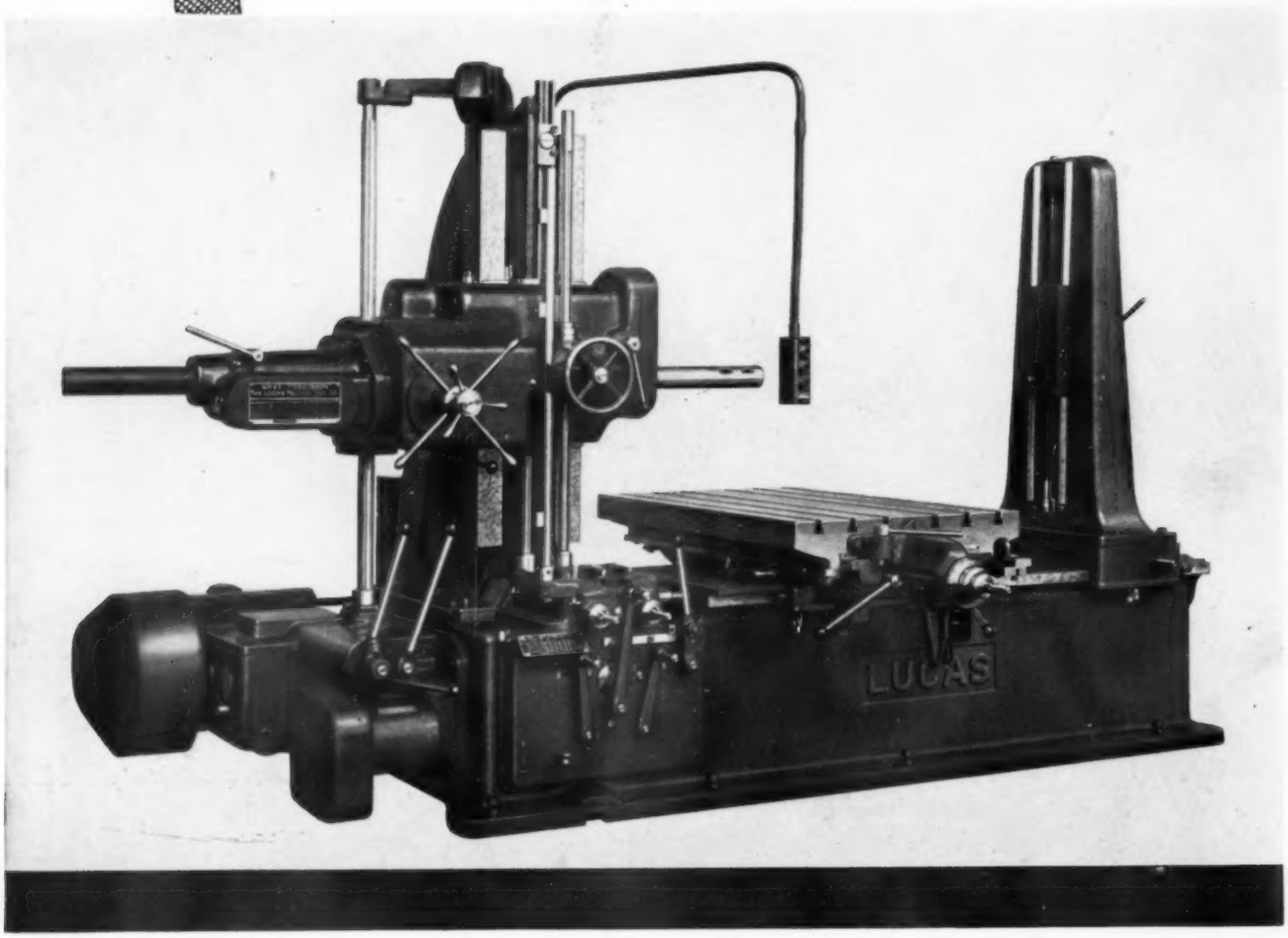
How Precise is Precision?

a LUCAS "41" has the answer for Horizontal Boring, Drilling and Milling



The LUCAS "41"—a 3", high speed machine with high-low speeds to the single spindle, gives you the highest degree of accuracy obtainable for toolroom or production work within the range of the machine.

The LUCAS "41" is electrical pendant controlled for start, stop, reverse and jog. On the high speed range, the Spindle is driven directly through multiple Vee Belts and with no gears driving direct to the Spindle. When the drive gears are out of mesh they provide the necessary flywheel effect for Carbide Milling. Fine feeds are provided for all speeds on the LUCAS "41" and dial indicators make jig boring a quick and simple operation.

LUCAS

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Hand Finishing Costs are High!

ELIMINATE HAND-FINISHING BOTTLENECK!

WITH ROTO-FINISH MECHANICAL FINISHING!

Speed Finishing Time and Cut Costs with ROTO-FINISH

Labor costs make hand finishing a bottleneck, which Roto-Finish solves by finishing mechanically, stampings, forgings, die castings, sand castings and machined parts.

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Roto-Finish not only slashes cost—it is far more accurate. Standards can be set up for finishing that provide the exact surface required on every piece. Let us process sample parts. No obligaton. THE STURGIS PRODUCTS CO., 712 Jacobs Street, Sturgis, Mich.

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THE UNIFORM MECHANICAL PROCESS—
FOR GRINDING • DE-BURRING • POLISHING HONING • COLORING

ROTO FINISH

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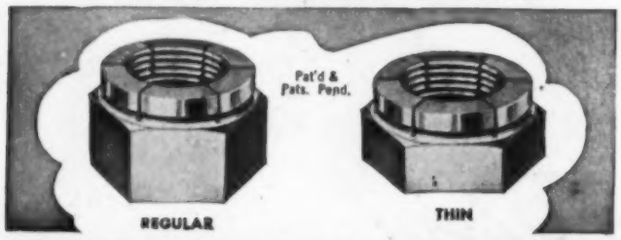

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SELF-LOCKING NUTS

"Flexloc" is of one-piece all-metal construction, available in U.S.S. and S.A.E. thread series. Every thread of the "Flexloc"—including the locking threads—takes its share of the load, and the torque is unusually uniform because it is controlled. "Flexloc" accommodates itself to a wide range of tolerances . . . can be used over and over again, without losing much of its locking torque . . . is not affected by temperatures likely to be met within the field of Mechanical Engineering . . . being a "stop" nut, *it stays locked* in any position on the threaded member.

It is made by the manufacturers of the unexcelled "Unbrako" Socket Screw Products—guaranteeing quality. Sizes from #6 to 1" in diameter—in both "regular" and "thin" types (shown above).

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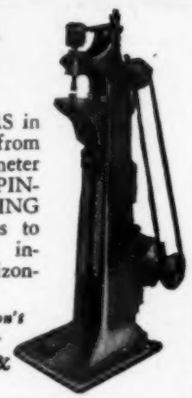

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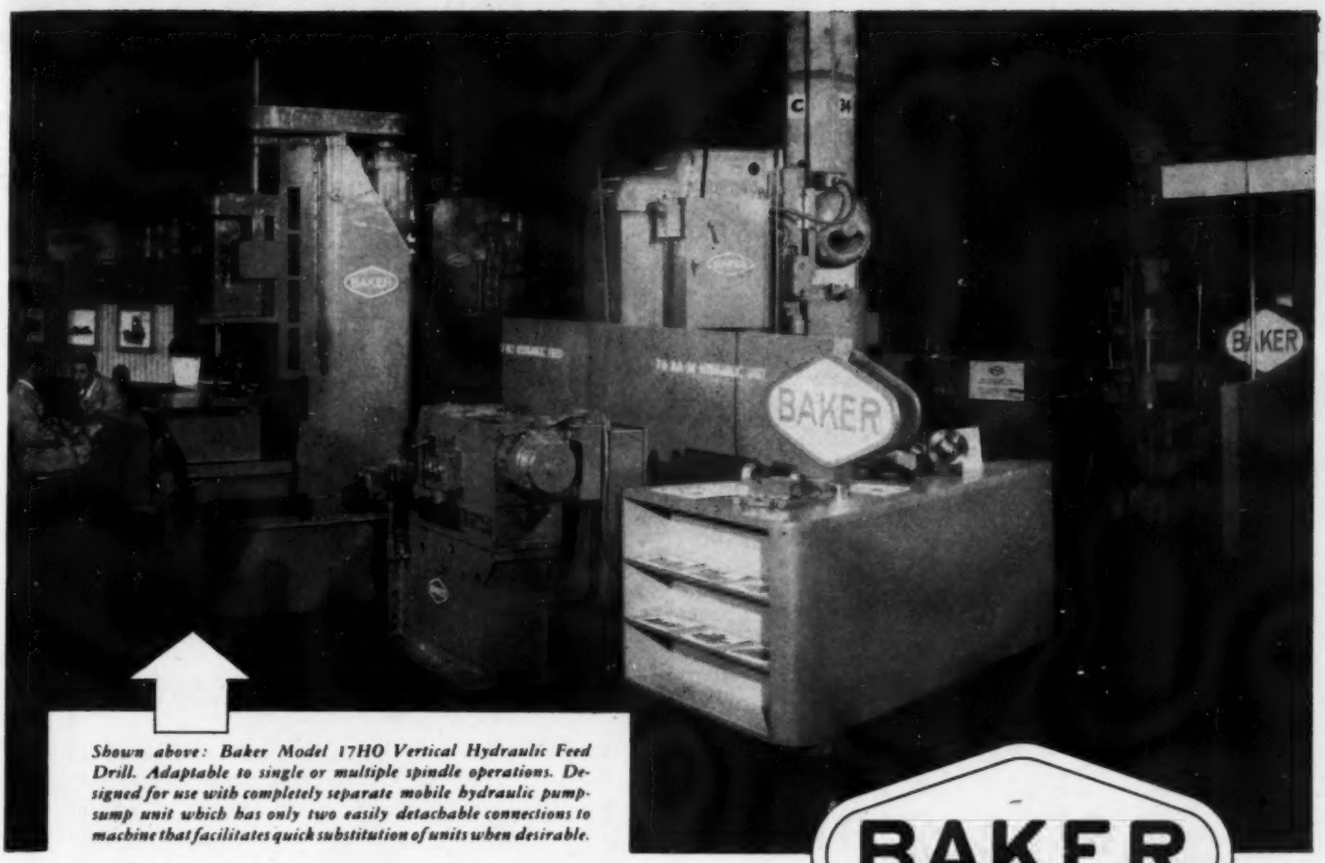
HUDSON N Y

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.



Shown above: Baker Model 17HO Vertical Hydraulic Feed Drill. Adaptable to single or multiple spindle operations. Designed for use with completely separate mobile hydraulic pump-sump unit which has only two easily detachable connections to machine that facilitates quick substitution of units when desirable.

BAKER

A Great Success

Through the cooperation of the entire metal-working industry, the Chicago Machine Tool Show has been a great success, and will be remembered as an outstanding event in the history of the Machine Tool Industry. The benefits to users of modern machine tools will be felt for years to come.

Machine tool buyers have seen the new tools which will enable them to reduce cost and increase volume of production through greater efficiency in operation and reduction of downtime to a minimum.

Baker introduced new models engineered for productivity with increased accuracy for drilling, boring, tapping and keyseating operations. Write today for the new circulars covering these machines, or contact the nearest Baker dealer.

Domestic Dealers of BAKER Machinery

Anderson Machine Tool Co., St. Paul, Minn.
Mr. James W. Barr, P.O. Box 336, Tuckahoe, N.Y.
Buckner-Weatherby Co., Inc., Seattle, Wash.
Chandler Machinery Co., Atlanta, Georgia
Joseph F. Dohan Machine Tools, New Orleans, La.
Jeffreys Engineering & Equipment Co., Raleigh, N.C.
George Keller Machinery Co., Buffalo, N.Y.
Machinery Sales Co., Los Angeles—San Francisco
Marshall and Huschart Machinery Co., Chicago, Illinois
McVoy-Hausman Co., Birmingham, Alabama
Motch & Merryweather Machinery Co., Cleveland—Detroit—Cincinnati—Pittsburgh
J. F. Owens Machinery Co., Syracuse, N.Y.
Sam H. Penny Co., Houston, Texas
Perry Machinery Co., Dallas, Texas
Stedfast & Roulston, Inc., Boston, Mass.
Robert R. Stephens Machinery Co., St. Louis, Mo.
Swind Machinery Co., Philadelphia, Pa.

BAKER BROTHERS INC., TOLEDO, OHIO

DRILLING . . . TAPPING . . . KEYSEATING . . . CONTOUR GRINDING MACHINES

now you see at a glance

WHICH BLADE TO USE

HOW BEST TO USE IT

No guesswork about using the *right* hack saw or band saw blade in the *right* way for any job when you use the new Victor wall chart—and that means faster and cleaner work, no rejects, no broken blades.

Printed attractively in two colors this Victor chart tells at a glance exactly which hand, band, or power blade to use on *any* material. It gives money-saving, work-speeding suggestions on the proper use and care of blades.

Write on your letterhead today for your free Victor wall chart and hang it near the tool crib or in your machine shop for ready reference. It's absolutely free.

Turn to your Victor supplier, too, for better-cutting, longer-lasting blades. He has a Victor blade for every job a hack saw or band saw can do—one that you can rely on to give you fast, clean cuts on metals, plastics and other non-metallics.

3375

VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades; Frames and Band Saw Blades

Haunted by supply problems?

Solve 'em by Air Express!

Don't let low stocks or distant supply points scare you! With Air Express cutting delivery time down to a matter of hours, you can get what's needed from anywhere in a rush. Just remember to specify Air Express. Your shipment flies to you at speeds up to 5 miles a minute. Air Express goes on all flights of all Scheduled Airlines—that means the fastest possible service.

Use Air Express regularly. You'll find there's real profit for you in such speedy service. And rates are *low*. Frequent flights to and from points overseas can simplify your foreign shipping problems, too. Investigate.

Specify Air Express—it's Good Business

- Low rates—special pick-up and delivery in principal U.S. towns and cities at no extra cost.
- Moves on all flights of all Scheduled Airlines.
- Air-rail between 22,000 off-airline offices.
- Direct air service to and from scores of foreign countries.

Just phone your local Air Express Division, Railway Express Agency, for fast shipping action . . . Write today for Schedule of Domestic and International Rates. Address Air Express, 230 Park Avenue, New York 17. Or ask for it at any Airline or Railway Express Office. Air Express Division, Railway Express Agency, representing the Scheduled Airlines of the United States.

AIR EXPRESS

AIR EXPRESS

GETS THERE FIRST

Fastest delivery—at low rates

Machine parts (75 lbs.) in Chicago were needed by a bottling works in Dallas *fast*. Picked up 10 A.M. the 6th, delivered same day at 5:05 P.M. 795 miles, Air Express charge **$18.42.** Other weights, any distance, similarly inexpensive and *fast*.

LIGHTNING REVERSALS without shock

Long Life of Taps, Accurate Depths and Class Three Fits can be had when you use LELAND - GIFFORD Reversing Motors for Tapping.

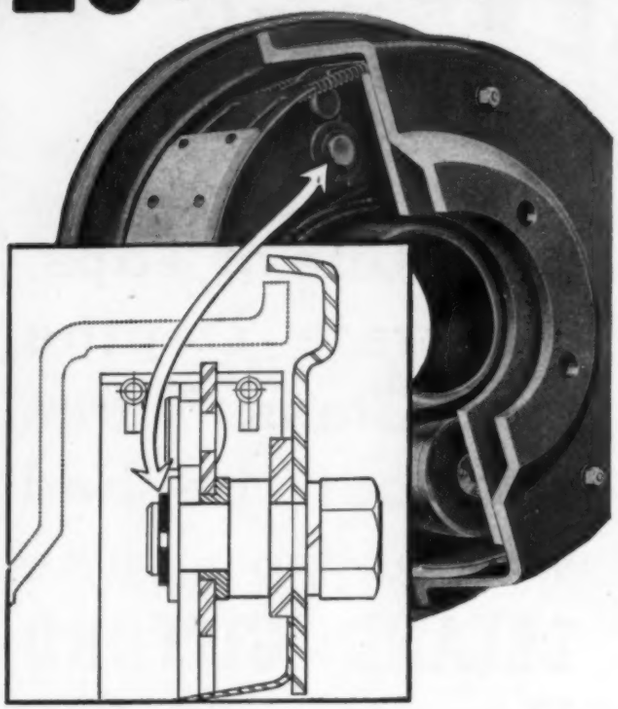
The same spindle can be instantly changed to a drilling spindle.

Bulletins 300B and 400A explain. Send for them.

LELAND-GIFFORD

WORCESTER 7, MASSACHUSETTS U. S. A.

RETAINING RINGS CUT ASSEMBLY COST 25% plus, plus!



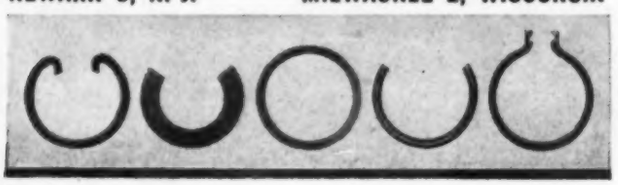
Not only was 25% saved in assembly cost but the additional savings included elimination of a nut, the threading of one end, and the cutting off of ⅜" of an anchor pin in these fine Magdraulic Electric Brakes made by The Empire Electric Brake Company, Newark, N. J.

National Retaining Rings are being used more and more as smart postwar designers look over their products and machines to eliminate such needless waste as cutting down shafts to make shoulders. Instead, they groove their shafts and housings to apply these efficient yet inexpensive steel rings. No doubt you could save money and material too.

Write today for our retaining ring folders.

THE NATIONAL LOCK WASHER COMPANY

NEWARK 5, N. J. **MILWAUKEE 2, WISCONSIN**



Fluidmotion Radius and Angle Dressers save time in ACCURATE FORM DRESSING

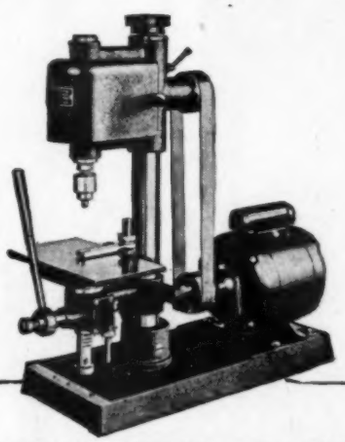
"FLUIDMOTION", an exclusive J & S development, automatically blends any combination of angles and arcs in **one** continuous motion, with **one** setting, using **one** *handle*. Produces clean, precise form without tool or chatter marks. Available in models **C, E** and **F** . . . also the **Form Master**, an accurate lower priced dresser. Send for folder.

***Fluidmotion* FEATURES**

- *automatic centering*
- *.0001" accuracy*
- *one setting per form*
- *14" wheel capacity*
- *large radius range*
- *dustproof*
- *chatterless*

*Reg. U.S. PAT. OFF

J&S TOOL CO. 479 Main Street, East Orange, N. J.



INSTRUMENT TAPPER

(SUPER-SENSITIVE)

The Hamilton Super-Sensitive Tapping Machine is designed for the precision industries. Tapping capacity, from the smallest and finest tap to 10-32 inclusive.

This machine has every wanted feature. Ease of operation. Height adjustable table. Adjustable stops. Ample clearances and travel. Silent and clean in operation.

Patented power transmission permits centering of tap without cutting and tapping to the very bottom of blind holes without tap breakage.

Our Bulletin T-47 gives the story and specifications complete. Write for it.

THE *Hamilton* TOOL COMPANY

810 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

✔ WIDTH You Want
✔ DEPTH You Want
✔ STROKE You Want
✔ TONNAGE You Want

in any practical combination and without paying for a "special" press

TYPE S
Capacities 60 to 250 tons

In developing this new line of presses, Clearing engineers have not only produced machines of remarkable basic worth, but have made it possible to offer unusual flexibility of specification without serious penalty in the way of cost. Thanks to the welded steel construction—a procedure which Clearing pioneered long ago—dimensional variations in small increments are easily provided. Ingenious planning of the mechanical parts permits wide interchangeability. In short, with the Type S, Clearing is able to build virtually a special press out of stock parts. This means a saving of both time and money for press buyers.

Maximum economy of production in this competitive world can be attained only when the machinery is properly fitted to the task. Here is the way to get presses which exactly match your requirements, giving you top productive efficiency without undue capital investment. We urge you to consult Clearing engineers as to the best way you can apply this opportunity to your own profit. Write for full information.

MECHANICAL AND HYDRAULIC PRESSES • 45 TONS CAPACITY AND LARGER

CLEARING

THE WAY TO EFFICIENT MASS PRODUCTION

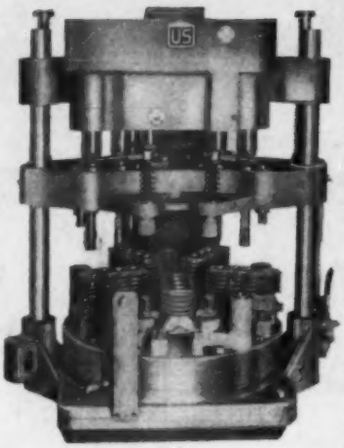
CLEARING MACHINE CORPORATION
6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

An 8-hour day's work finished in 49 minutes

The Campbell-Hausfeld Co. of Harrison, Ohio, large manufacturers of Air Compressors, have been able to accomplish in less than one hour what they formerly did in one 8-hour working day. U. S. Drill Head Co. made this possible!

This photograph shows a drilling head complete with boring bars with Carboloy tipped cutters and Stellite wear strips. The five-position indexing table has necessary holding fixtures with bushing guide plate suspended from head, locating over hardened dowel pins in each position in the fixture.

Operation: Semi-finish cylinder bore to 1.373—1.3735″ for honing operation.



Production: 90 pieces per hour 85% efficient.

Machine operates as follows enlarging 1¼″ cored hole to 1.373″ diameter:

Station #1: Unload and load one piece.

Station #2: Rough bore two cylinder holes.

Station #3: Rough bore two cylinder holes to 1.340″ diameter.

Station #4: Semi-finish two cylinder bores.

Station #5: Semi-finish two cylinder bored to 1.373-1.3735″ diameter.

This allows only .002—.0015″ stock to be removed by honing machine, which formerly had to be .006″ to .007″ due out of roundness of holes; thus cutting time for this operation.

US HEADS SINCE 1915

Also manufacturers of all types of fixed center heads.
WRITE TODAY for descriptive catalogs.

UNITED STATES DRILL HEAD CO.

CINCINNATI 4, OHIO

"Standard" ROLLING MILLS

FOR HOT OR COLD ROLLING OF STRIP, ROD AND INGOT

Speeds are provided for rolling metals in any range to 1000 feet per minute and tandem mill stands are designed with constant torque to synchronize stock between stations. Two, three, or four high Mills have roll sizes from 1½″ diameter and 1″ face to 16½″ diameter and 18″ face. Special units are also available for grading, cross and pinch rolling, forming wire to exact dimensions and for various shaping operations. Write for Catalog RM.

STANDARD MACHINERY CO.
1565 Elmwood Avenue, Providence 7, Rhode Island

MANUFACTURERS OF Power Presses to 500 Tons Rolling Mills • Swagers • Turks Heads • Steel Die Sets

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DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

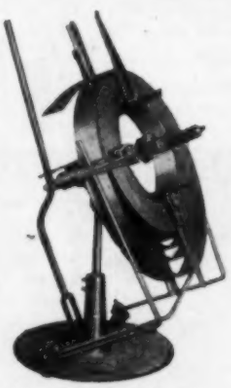
DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

LUERS

Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.



No. 3 Littell Reel. Capacity, 300 lbs.

Reel-Off Coil Stock
Faster at Less Cost with LITTELL REELS

COIL feeding with LITTELL Automatic Centering Reels increases production, lessens waste, improves quality, loads easier. Littell Reels are made in plain or motor-driven types for handling coils 100 to 20,000 lbs. Littell also makes Roll Feeds, Straighteners, Safety Feeders, etc.

Send for Bulletins

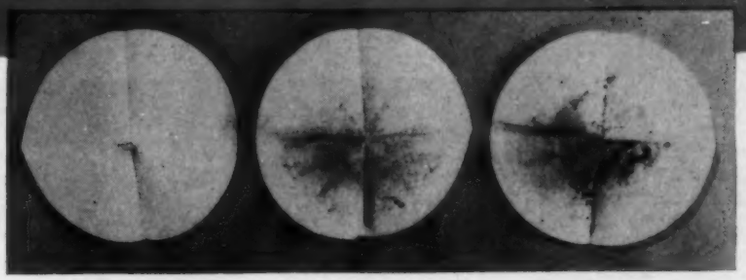
F. J. LITTELL MACHINE CO.
4169 Ravenswood Ave.
Chicago 13, Ill.

HERE'S PROOF THAT HOUGHTON'S ANTISEP SOLUBLE OIL

1. Settles out faster in reservoir . . .

2. Carries less contaminants in solution . . . and

3. Won't load up the grinding wheel



Left—After filtering Antisep Soluble Oil. *Center*—Coolant No. 2 carries more contaminants in solution. *Right*—Coolant No. 3 has greatest contaminants to load up wheel.

Here's a plant test that proves what we've continuously claimed for Antisep Soluble Oil. The plant was finish-grinding crankshafts, and was using three different coolants on identical machines.

We took samples of each coolant from the nozzle where it came out on the wheels, and after shaking well, filtered 200 cc. of each. The filter papers were weighed before and after, with these results:

Antisep —1.9 grams of contaminants removed.

Coolant #2—2.18 grams removed.

Coolant #3—2.4 grams removed.

The contaminant was analyzed and found to contain 86% iron, 1.1% carbon, .37% silicon, 4% aluminum and the balance, binder from the wheel. The first two coolants were diluted 100 to 1 with water. No. 3 was a 40-1 dilution.

The results are summarized above. They point to Antisep as the answer to your grinding coolant question, because it settles contaminants out rather than carry them in solution. That means finer finishing of surfaces, and no loading up of the grinding wheel.

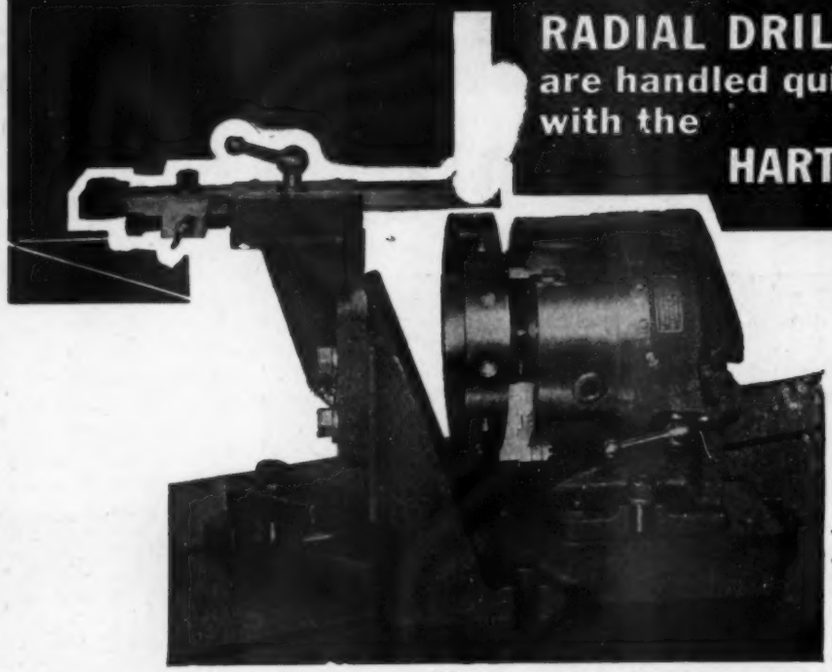
Antisep costs less, prevents rancid odor, is kind to operators' hands, is usable for longer periods. When you are ready to try Antisep, we'll be ready too.

E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Philadelphia 33, Pa.

Service and Sales Offices in All Principal Cities

RADIAL DRILLING OPERATIONS
are handled quickly and accurately
with the
HARTFORD SUPER-SPACER



Shown here, the SUPER-SPACER is equipped with radial drilling attachment attached to the base of this modern spacing device. A fast, accurate means of indexing is provided, set up time reduced and variations in length and diameter conveniently handled. All possibility of error is eliminated by the mask plate feature of the SUPER-SPACER.

With its attachments and fixtures, the HARTFORD SUPER-SPACER will speed up a wide variety of indexing operations including milling, drilling, jig boring, grinding and slotting. These many uses are indicative of the versatility of the SUPER-SPACER and point to the advisability of your careful investigation of this modern spacing device as a means to speed up your production.

Full details on request

THE
HARTFORD SPECIAL MACHINERY CO.
HARTFORD 5, CONN.

LINLEY

MILLER
AND
JIG BORER

Handles a wide variety of toolroom jobs with speed, accuracy, efficiency . . . die work, jig and model making, drilling, reaming, milling. Releases larger machines for work better suited to their capacities. Easy set-up, quick changeover . . . velvet-smooth feed, eight spindle speeds from 275 to 4250 rpm. . . simple, direct micrometer setting.

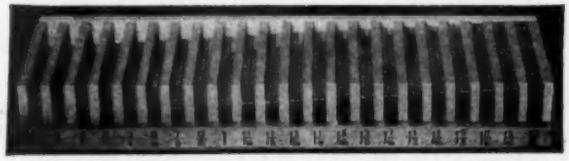
FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 664 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

For *Faster Smoother Cleaner* *Grinding*
ECONOMY
Grinding and Cutting Oils and Lubricants for Every Metal Working Purpose
THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.

ANTON PARALLELS

INCREASE PRODUCTION IMPROVE QUALITY USE ANTON PARALLELS ANTON PARALLELS FILL A LONG-FELT NEED—Permanently straight and accurate, yet priced for general machine shop use. All fully guaranteed to be within the limits specified. Maximum size tolerance .001 inch on ground sides. Maximum variation in parallelism and straightness within length, .0001. Rockwell "C" hardness 65 up.



Price per set includes a handy Wooden Container. Large Stock of Single Pairs also Available. All Prices are F.O.B. New York

ANTON MACHINE WORKS
52 Sands St. Tel. TR. 5-8092 Brooklyn 1, N. Y.

Only TRADE Verson MARK gives you

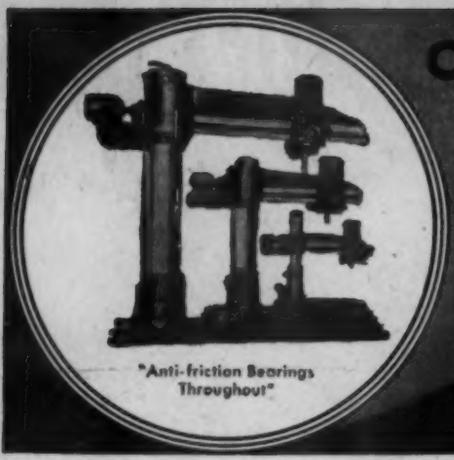
these 10 Outstanding HYDRAULIC PRESS features

1. With HYDROL, the new simplified hydraulic circuit by Verson, high pressure lines have been shortened, valving and piping reduced to an absolute minimum.
2. Verson improved high tensile strength, automotive type cylinder provides positive straight-line reciprocating motion of the platen.
3. Verson "Velvet Touch" shockless sliding seatless type surge valve.
4. Controls and valves readily accessible for adjustment.
5. Automatic changeover to full pressure made smoothly—without shock—before punch contacts the work.
6. HYDROL circuit incorporates automatic decompression, virtually eliminates dwell period before reversal can be made.
7. 4-point SQUARE TYPE gibs with renewable bronze liners, are adjustable in two directions.
8. Electrically controlled press operation, may be arranged for single stroke and continuous cycle production.
9. Accurately guided Verson cushions on renewable guides, to give full even blank-holding through entire stroke.
10. All Verson Presses feature the allsteel welded frame originated by Verson over 25 years ago.

Send for your copy of the Complete New factual HYDRAULIC PRESS Catalog

ERSON ALLSTEEL PRESS CO. 9216 So. KENWOOD AVENUE CHICAGO • ILLINOIS

Subsidiary of pioneer builders of Allsteel Welded Presses



CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON
MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

The FORCE
AUTOMATIC NUMBERING HEAD
Now With Corrosion-Proof Finish

A versatile tool for metal numbering, supplied with 1/64 to 3/8 inch Roman or Gothic figures, 4 to 7 wheels. Both consecutive and repeat settings are standard in all models.

SEND FOR CATALOG of indenting and embossing numbering heads, steel stamps and dies, steel type and holders, hand and power presses, rotary marking machines, etc.

WM. A. FORCE & COMPANY
INCORPORATED
216 NICHOLS AVENUE, BROOKLYN 8, NEW YORK, U.S.A.

tops
in the
tool
room

Save three ways with Grand Rapids No. 10-B Combination Tap and Drill Grinder:
1. Lower first cost; 2. Less maintenance expense;
3. Valuable floor space.

Write for Bulletin G.L. 8-46

Grand Rapids 10-B Combination Tap and Drill Grinder

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

1650° F. attained quickly
←Atmospheric Pot Furnaces for Salt, Cyanide, Lead Hardening and Melting Aluminum and Zinc.

2400° F. attained quickly . . . with "BUZZER" Full Muffle Furnaces. Designed primarily for heat treating high carbon and alloy steels. →

BUZZER Gas Fired FURNACES
Reg U.S. Pat. Off.

Attain High Temperatures, without BLOWER, POWER *or other* AUXILIARY EQUIPMENT . . . *just connect to Gas Supply.*

All "BUZZER" Industrial Gas Furnaces are rugged in construction, efficient in design, economical in operation and fully insulated to give years of satisfactory service.

The "BUZZER" Catalog gives full details and information on wide range of models and sizes available for Heat Treating applications, Burners and other equipment. Send for it today.

CHARLES A. HONES, INC.
121 South Grand Avenue, Baldwin, L. I., N. Y.

LITTLE BOLTS DO BIG JOBS for Agriculture

NOWHERE has progress been more pronounced than in the development of farm machinery . . . equipment in which special type nuts and bolts play an increasingly important part. A good example of this is the unique tractor bolt illustrated above . . . produced by the Buffalo Bolt Company.

Circle Ⓑ nuts and bolts are noted for their uniform size and strength. No matter what your requirements, the controlled quality of all Circle Ⓑ products, standard or special, will enable you to improve your production efficiency and the stamina and reliability of the equipment you produce and sell.

Did you know that Buffalo Bolt Company has designed and built many highly efficient nut and bolt making machines, one of which is illustrated.

Ⓑ **BUFFALO BOLT COMPANY**

NORTH TONAWANDA, N. Y. • SALES OFFICES IN PRINCIPAL CITIES

Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

Hammond

OD CYLINDRICAL GRINDING and POLISHING MACHINE

FOR RODS, BARS AND TUBES 1/8" to 1 1/4" DIAMETER

The OD-1 is a Centerless Grinder using coated abrasive belts for grinding and polishing rods, bars and tubes of any metal, plastics, glass, ceramics, etc. For stock removal it will remove up to .005" per pass on ferrous metals, and up to .010" on non-ferrous metals. With work supports it will handle ½" bars up to 18' in length and 1" bars up to 8' in length. Accuracy .001" on production items — closer limits on some work.

FASTER, BETTER FINISHING FOR A WIDE VARIETY OF CYLINDRICAL SHAPES

SEND SAMPLES!

SEND one finished sample and a few rough samples for a complete Engineering Report. NO OBLIGATION.

Hammond Machinery Builders INC

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If you want
MORE PARTS *per hour*
LOWER COST *per part*

the BARKER WRENCHLESS CHUCK can do it faster, better and stand up to it longer. Where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine, these Chucks will increase production and pay for themselves in 60 to 90 days while doing it. See how a Barker Wrenchless Two-Jaw or Three-Jaw Chuck can speed up production in YOUR plant.

Chuck Division
THOMAS HOIST CO.
22 S. HOYNE CHICAGO 12

The SUPER METHOD

of TRIMMING FORMED PARTS
and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind. Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

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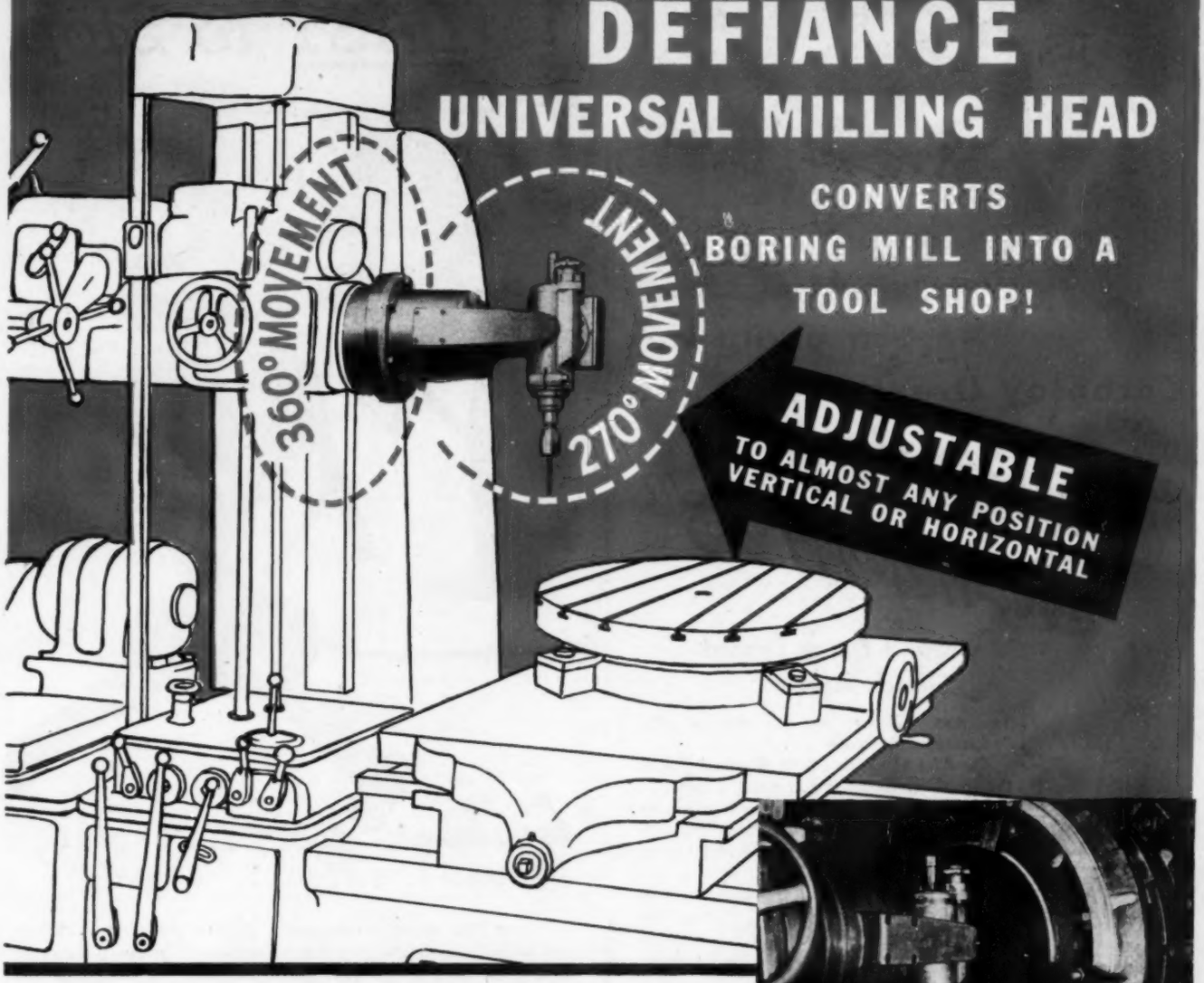
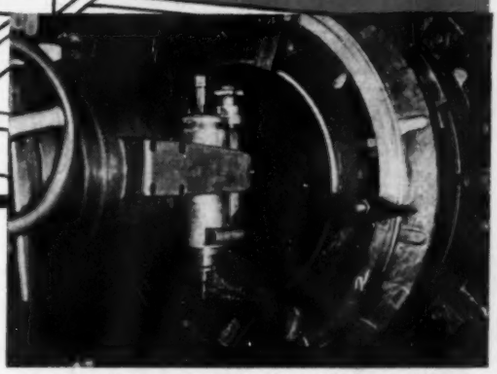
FRICTION SAWING *with* Tannewitz
HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

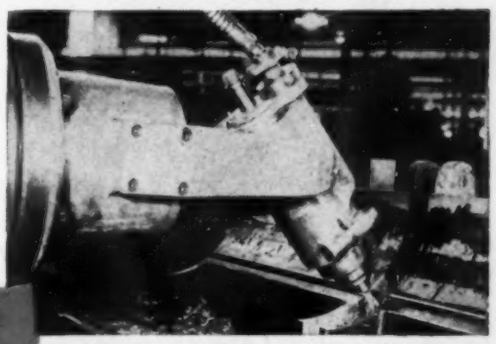
DEFIANCE
UNIVERSAL MILLING HEAD

CONVERTS
BORING MILL INTO A
TOOL SHOP!





A hard-to-get-at drilling job easily done with the universal milling and drilling head.



Milling an included angle slot with head set at 45°

Now—your Defiance Horizontal Boring Mill can do the work of a tool shop—with greatly increased flexibility made possible with a Defiance Universal Milling Attachment!

Handles precision boring, milling and drilling at almost any angle, vertical or horizontal, *in the original set-up*—saving time and labor and eliminating multiple set-ups. Can mill a flat face at any angle from 0° to 360° concentric with the spindle or from 0° to 270° at right angles or parallel to the spindle. Uses 2″ diam. facing cutter with 2½″ adjustment of its spindle sleeve. Sturdily constructed . . . Quickly and easily attached. Write for bulletin 847 . . . Defiance Machine Works, Inc., Defiance, Ohio.

DEFIANCE
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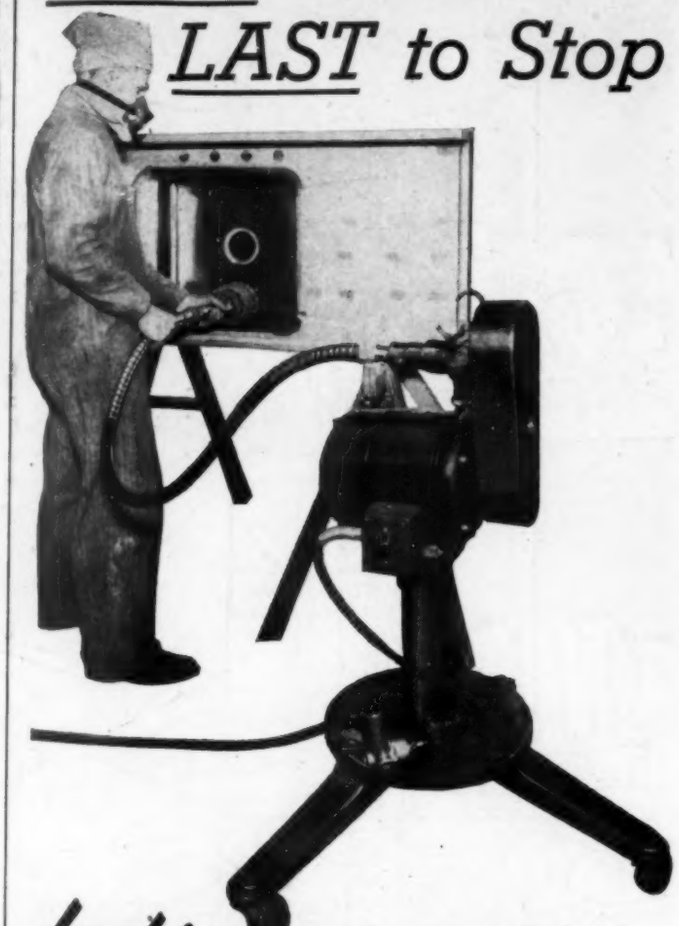

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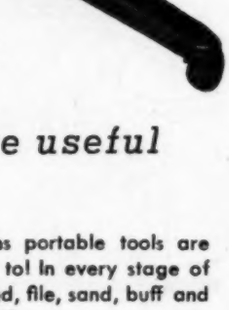
Haskins flexible shaft machines offer you a quality and usefulness that are worth investigating. Do that—now! Ask for Catalog No. 45. **R. G. Haskins Company,** 2641 W. Harrison Street, Chicago, Illinois.



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New Catalogs, Booklets, Bulletins

(Not good after January 2, 1948)

MACHINES AND ATTACHMENTS

1 MILLING, GRINDING—Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio. 104-page booklet M-1613 illustrates complete line, including seventeen new-design machines (plus two specials) exhibited at Machine Tool Show.

2 AUTOMATIC MACHINE — The Cleveland Automatic Machine Co., Cincinnati 12, Ohio. 6-page bulletin describes 2½-in. Model AB Dialmatic which can be used either as a bar machine or chucker. Has single spindle, five-hole turret, electric feed drive.

3 TURRET LATHE—Potter & Johnston Machine Co., Pawtucket, R. I. 16-page bulletin illustrates and describes seven automatic turret lathes. Includes special features and specifications of various models of each type.

4 PROCESSING MACHINES—Greenlee Bros. & Co., Rockford, Ill. 8-page bulletin covers development of line of automatic-transfer processing machines. Includes description of latest machines.

5 CLEANING EQUIPMENT—American Wheelabrator & Equipment Corp., Mishwaka, Ind. Series of booklets describes application of airless abrasive blast-cleaning equipment to gray iron, steel, malleable and non-ferrous foundries and heat-treat and forge shops. Each booklet deals with specific industry.

6 STEAM PLATEN PRESSES—Baldwin Locomotive Works, Philadelphia 42, Pa. 12-page bulletin carrying 23 photographs of presses, both standardized and custom built. Standardized units are from 100- to 1275-ton capacity.

7 BELT SURFACER—Production Machine Co., Greenfield, Mass. 4-page bulletin 10 covers wet or dry horizontal-belt surfacing machine. Unit has 20x30-in. operating surface for handling large work. Standard belt surface speed is 4600 fpm.

8 LATHES—Sidney Machine Tool Co., Sidney, Ohio. 24-page catalog illustrates and describes entire line of Sidney lathes with specifications. Detailed pictures of important parts, such as headstock, bed and ways, apron and gearbox.

9 MULTI-SLIDE MACHINES—U. S. Tool Co., Inc., Ampere, East Orange, N. J. 14-page bulletin 15 contains specifications for four sizes of Multi-Slide machines made for fabrication of precision parts from coil stock. Includes two new sizes.

TOOLS AND ACCESSORIES

10 CARBIDE TOOLS—Willey's Carbide Tool Co., Detroit 1, Mich. 40-page catalog 30 covers diversified uses of Willey's Metal including special tips, core drills and reamers, ring and plug gages. Includes prices.

11 BUR-OLOGY—Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn. 34-page booklet, "BUR-ology," concerns the uses and abuses of burs. Includes short history of burs, describes various types, tells what speeds to use.

12 MILLING CUTTERS—W. T. Howald Machine Works, Brooklyn 31, N. Y. 4-page bulletin 23 describes shell, face and end mills, carbide tipped. Blades have square shanks and are held by improved locking methods.

13 SHOP MALLETS—Hills Manufacturing Co., New Providence, N. J. 4-page bulletin describes the various interchangeable heads available for "2-in-1" shop mallets, giving types and head diameters.

14 MEASURING MACHINES—Merz Engineering Co., Indianapolis 7, Ind. 20-page bulletin covers New-Matic Measuring machines. Explains "point-to-point" and "balanced-air" types of gaging.

15 MILLING CUTTERS—O.K. Tool Co., Inc., Shelton, Conn. 60-page catalog 13 gives information on tool-milling cutters, reamers, boring heads, counterbores, and special design tools. Chart included on feeds and speeds.

16 ECONOTOOLS—Econotool Co., Jenkintown, Pa. 4-page bulletin describes features of "2-in-1" Econotools for turret lathes, engine lathes, small boring mills. Units are toolholders with two clamping positions for bit.

17 PRECISION INSTRUMENTS—The Gaertner Scientific Corp., Chicago 14, Ill. 8-page bulletin is survey of precision measurement instruments made by Gaertner. Includes linear, coordinate, angular, spectral and time measurements, and dividing heads.

18 DIAMOND WHEELS AND HONES—Norton Co., Worcester, Mass. 56-page catalog lists standard sizes of diamond wheels and hones under each standard type. Illustrates various basic types.

19 TORQUE INDICATORS — Blackhawk Manufacturing Co., Milwaukee 1, Wis. 36-page catalog 46T describes six torque-indicator models with capacities from 50 to 1000 ft.-lb. These tension wrenches are, in effect, socket-wrench handles which measure amount of pull exerted.

HEAT-TREATING AND WELDING

20 RESISTANCE WELDING—Sciaky Bros., Chicago 38, Ill. 8-page bulletin 136A describes "Three Phase" resistance-welding system which achieves balanced three-phase load at near unity power factor through use of electronics.

21 TUBE FURNACE—Burrell Technical Supply Co., Pittsburgh 19, Pa. 4-page bulletin 459-47 describes and illustrates features of Unit-Package tube furnaces for temperatures to 2650 F.

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22 PYROMETERS — Illinois Testing Laboratories, Inc., Chicago 10, Ill. 4-page bulletin describes Alnor instruments including pyrometers, electrical resistance thermometers, temperature controllers and dew-point indicators.

23 TEMPER DESIGNATIONS—Aluminum Co. of America, Pittsburgh 19, Pa. 16-page booklet covers Alcoa aluminum-alloy temper designations for cast and wrought products. Effective on all shipments made after Oct. 1, 1947.

PLANT SERVICE EQUIPMENT

24 MACHINE LIGHTS—Vimco Mfg. Co., Buffalo, N. Y. 4-page bulletin 74 illustrates and explains line of localized incandescent high-intensity lighting for machines. Includes six standard models and list of interchangeable parts for special lights.

25 OVERHEAD TROLLEY—Link-Belt Co., Chicago 1, Ill. 8-page bulletin 2241 covers ball-bearing overhead conveyor trolley. It has no wheel shafts or spindle and does not require separate retainers.

26 MARKING DEVICES—Rivet-O Mfg. Co., Orange, Mass. 23-page booklet describes marking devices for office and factory including stamp pads, rotary daters, time stamps, stamp sets and other specialties.

27 ELECTRICAL FEEDRAIL—Feedrail Corp., New York 7, N. Y. 28-page catalog 20 illustrates and describes recent developments in Electric Feedrail distribution system as applied to portable lights and tools, moving test lines, hoists and other applications.

PARTS AND MATERIALS

28 PRE-FINISHED METALS—American Nickeloid Co., Peru, Ill. 16-page "N-M Fabrication Handbook" illustrates and describes proper bending, blanking, drawing, etching, forming, riveting, seaming, soldering, and welding operations involved in the handling of pre-finished Nickeloid metals.

29 FLUIDS AND LUBRICANTS — Special Products Div., Carbide and Carbon Chemical Corp., New York 17, N. Y. 24-page pamphlet discusses in detail the important properties and uses of several series of "Ucon" fluids and lubricants.

30 TOOLS AND CASTINGS—Redhard Metals Inc., Hatboro, Pa. 8-page bulletin describes cutting tools, precision castings, high-temperature alloys, and metal forming and nishing.

31 LUBRICATION—Bijur Lubricating Corp., Long Island City 1, N. Y. 4-page bulletin NB-1 covers Bijur system of controlled oiling of bearings for various types of industries.

32 PRESSURE SWITCHES—Furnas Electric Co., Batavia, Ill.. 12-page bulletin 4502B illustrates and describes automatic pressure switches for water systems and air compressors. Also available is 4-page bulletin 4702T on series "A" motor controllers.

33 MACHINE-TOOL MOTORS — Owens-Corning Fiberglas Corp., Toledo 1, Ohio. 12-page booklet covers the use of Fiberglas electrical insulation materials in machine-tool motors to reduce bulk and weight.

34 WROUGHT IRON—A. M. Byers Co., Pittsburgh, Pa. 20-page illustrated booklet, "The ABC's of Wrought Iron," tells what wrought iron is, why it lasts, how it is fabricated and used.

35 STAINLESS STEELS—Jessop Steel Co., Washington, Pa. 12-page booklet covers chemical analyses, physical properties, corrosion-resistance ratings and fabricating properties of stainless and heat-resisting steels.

36 RUBBER MOUNTINGS — Lord Manufacturing Co., Erie, Pa. 12-page bulletin 106 describes and illustrates shear-type bonded-rubber mountings for control of vibration from all directions.

37 CALCULATOR—Sterling Bolt Co., Chicago 6, Ill. Discount calculator includes both base and supplemental chain discounts. It is made of cardboard and operates on slide-rule principle. Useful for buyers of bolts, nuts and screws.

38 ADJUSTABLE-SPEED DRIVES — Reliance Electric & Engineering Co., Cleveland 10, Ohio. 4-page bulletin 311-A covers All-Electric ac. adjustable-speed drives in the 40- to 200-hp. range.

39 MAGNETS—Dings Magnetic Separator Co., Milwaukee 14, Wis. 12-page catalog 301-A describes rectangular double-gap electro-magnetic, suspended, spout and plate magnets, and wet type magnets for submerged installations.

40 CONTROL VALVES—Foxboro Co., Foxboro, Mass. 36-page bulletin 277-2 describes pneumatic control valves and controller accessories. Includes tables of specifications and also describes air-filter sets and other equipment.

41 BLACK COATINGS—Hilo Varnish Corp., Brooklyn 6, N. Y. 20-page bulletin covers properties and applications of complete line of black coatings. Describes enamels, air-dry and baking synthetics, lacquers, crystal finishes and other coatings.

42 ROLLER BEARINGS—The Torrington Co., Bantam Bearings Div., South Bend, Ind. 28-page bulletin 200-A describes line of anti-friction self-aligning spherical roller bearings for heavy-duty use.

43 TIME-CYCLE CONTROLLERS—The Bristol Co., Waterbury 91, Conn. 12-page bulletin C305 describes line of Model C500 Impulse-Sequence Time-Cycle controllers for tire presses, plastic molds, and general process operations.

44 NON-FERROUS PRODUCTS — Downs-Smith Brass & Copper Co., New York, N. Y. 250-page illustrated case-bound book lists more than 500 non-ferrous products carried in New York and Philadelphia warehouse stocks. Divided into ten sections, one of which includes terminology, tolerances, physical properties.

MISCELLANEOUS

45 CROSS-SECTION—National Automatic Tool Co., Richmond, Ind. 66-page cross-section of work performed on Natco drilling, boring, facing, and tapping machines for the metalworking industry.

46 VISIT TO PLANT—Toledo Scale Co., Toledo, Ohio. 20-page bulletin "Honest Weight," describes company's facilities, illustrating departments for research, engineering and manufacturing.

47 CONTRACT FACILITIES—Sandsea Inc., Providence 5, R. I. 16-page bulletin describes facilities of firm to meet die, tooling, design or special-machinery requirements of customers.

48 INSPECTED EQUIPMENT—Underwriters' Laboratories, Inc., New York 13, N. Y. 80-page catalog is supplementary listing of inspected appliances, equipment and materials related to accident, burglary and fire protection; automotive and electrical equipment; gas, oil and miscellaneous applications.

Available for immediate delivery!

TWO TOOLROOM MUSTS

Spots...Drills...Bores or Reams
All Holes In a Workpiece
With Minimum Tool Changes

With the Moore Jig Borer, there's less stop-and-start to change tools at individual holes for each operation, because no size blocks or end measures are necessary. *Built-in* lead screws, accurate to .0002" over 14" of travel, enable you to make table settings faster than you can change tools.*

Highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½", the Moore Jig Borer is ideally suited for jigs, fixtures, dies, machine parts and jig-less, small lot production.

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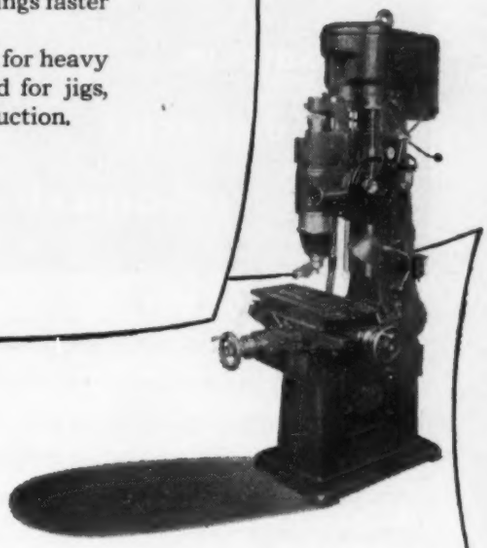

Mechanically Relocates and Finish-Grinds
Holes in Hardened Parts to .0001"
in ⅓ The Time of Other Methods

The Moore Jig Grinder eliminates hours of checking on the bench and surface plate to correct holes in hardened parts. No toolmaker's buttons or locating plugs are necessary, for this unique machine through the use of *built-in* lead screws *mechanically* relocates and finish-grinds straight or tapered holes in ⅓ to ¼ the time required by conventional methods.*

Working to figures instead of to "fit," the Moore Jig Grinder puts die making on an interchangeable parts and assembly basis for the first time. Die, stripper and punch plates can now be produced concurrently with better alignment of mating parts and more uniform clearance between punch and die.

MOORE JIG GRINDER

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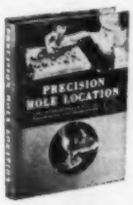

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Over 5,000 copies of this valuable book on toolmaking practices have been sold to date. Available at special price of $3 in U.S.A.; $3.50 outside U.S.A.—448 pages, over 400 illustrations, 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Send check or money order to Moore Special Tool Co., Inc., Bridgeport 7, Conn.

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Those blank spaces on your Name Plates can be filled in quickly and economically with serial numbers, lot numbers, dates, operating data, etc., with a Matthews Name Plate Stamping machine. Your name plate—and your product—will be enhanced by the neatness with which it is done.

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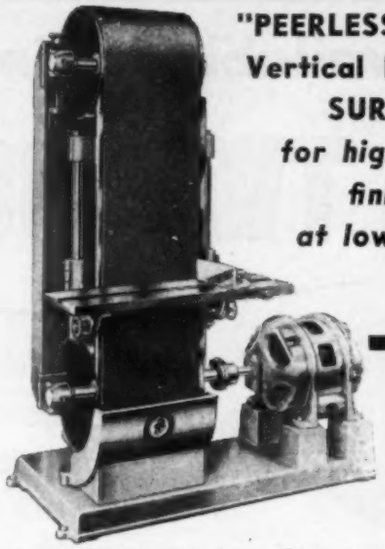

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Apex Bit Holders have revolutionized the use of power bits and hand drivers for Phillips, Frearson, Clutch Head, Slotted, Socket and Hex Head screws. Here's why:

1. They do a big job with a minimum inventory. Just obtain the bit holders you need (they last indefinitely), then order tips (of whatever type you need), discard the worn out tips and insert new ones.

2. Holders accommodate the short, money-saving, steel-saving bits in a full range of sizes. Holders furnished for practically all makes of power and spiral drivers.

3. On hex head screws each replaceable, long-wearing socket has two lives. Use one end till it is worn, then turn end for end—and you have a new socket.

Catalog No. 20 gives you all the facts. Write for it.

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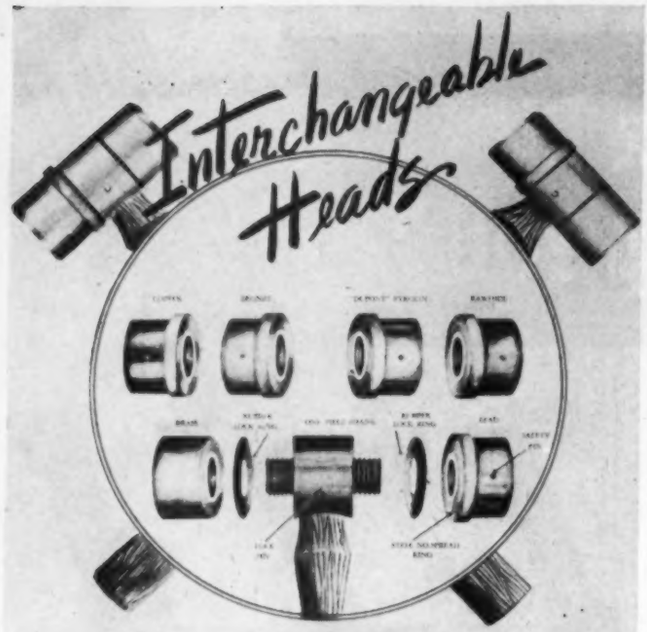

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Designed by a shop man for Shop Men

This NEW development in machinists' hammers provides economy, ease of handling and simple replacement of heads. These tools are available with any or all six easily interchangeable heads of different materials to meet specific needs. Heads are locked on in use and cannot work loose. The use of malleable heads assures protection from chipping or marring tools, dies, molds or parts.

Exclusive Features

- Steel "No Spread" ring on head prevents spreading of head.
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- Lock Washer keeps head tight on handle.
- Shank . . . pinned to handle.
- Shank . . . all one piece.

Spark Proof Mallets are available for use under hazardous conditions in chemical and munition industries.

Don't Throw Away a Hills Mallet . . . Just Replace the Head.

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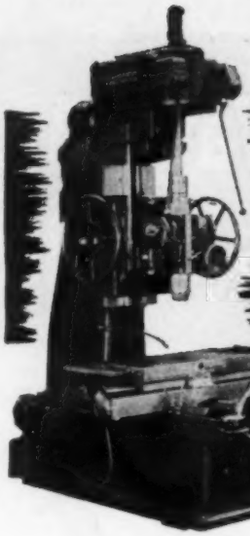

A RUTHMAN PUMP

to speed production
cut maintenance costs
give long service

Photo Courtesy: Fosdick Machine Tool Co. Cincinnati, Ohio

Instantaneous coolant flow, split-second control from a trickle to full volume, speeds production in your metal-cutting operations. Pre-lubricated over-sized bearings, one-piece dynamically balanced shaft, no metal-to-metal contact reduces wear and assures long trouble-free service for Ruthman Gusher Coolant Pumps.

Designed on centrifugal principles, Ruthman Pumps fit a wide variety of circulating pump problems. Illustrated is a Fosdick #30 Jig Borer equipped with a ¼ Model UL-7120 Ruthman Gusher Coolant Pump. *Ask for Catalog 10-A.*

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HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
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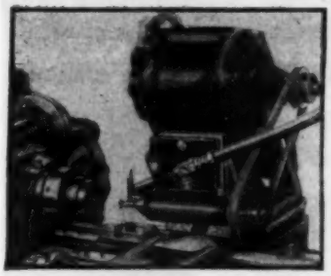
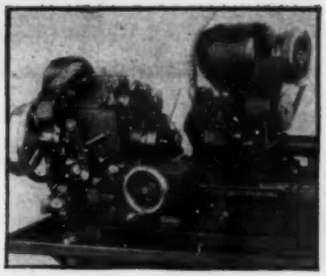
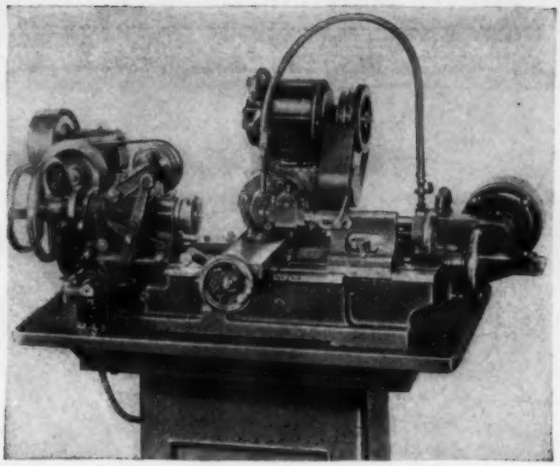


Machine equipped with Internal Milling Attachment



Machine equipped with Relieving Head



ALL STANDARD FORMS OF THREADS CAN BE PRODUCED TO CLOSEST TOLERANCES ON

WALTHAM THREAD MILLERS

Three motors on these machines provide a wide flexibility in operation as well as a constant supply of coolant for all requirements. By simply changing ratios, speeds are suitable for cutting either brass or steel. Waltham can furnish cutters for any thread form desired.

Machines are mounted on cabinet base with two shelves inside. Standard equipment includes: three motors with push button start and automatic or push button stop—follow rest—one milling cutter—indexing device for cutting multiple threads—5 pitch lead screw—change gears for cutting from 5 to 40 threads per inch.

Special Equipment Extends Utility

Extra equipment includes: a special work head for relieving—a special motor driven cutter head for internal threading—a multiple cutter threading attachment—automatic cam operation—special tailstock for multiple cutter work—translating gears for cutting metric threads—metric lead screw—plain taper attachment.

Write for Bulletin 244A giving detailed information.

WALTHAM MACHINE WORKS

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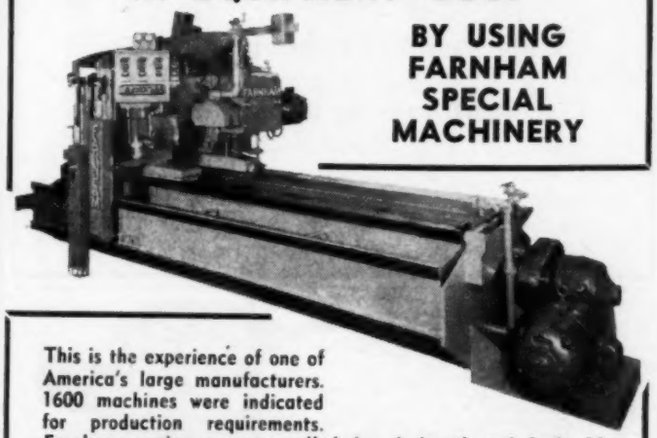
WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.

$10,025,000. SAVED

IN EQUIPMENT COST

BY USING FARNHAM SPECIAL MACHINERY



This is the experience of one of America's large manufacturers. 1600 machines were indicated for production requirements. Farnham engineers were called in, designed and built 12 machines that did the same work with a saving in equipment cost, labor and cutting down of spoilage. Learn the entire story from a Farnham representative and learn how Farnham engineers can help you to greater efficiency.

**No charge for consultation of course.*

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By W. A. NORDHOFF
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486 *pages*, 5¼x8¼, 486 *illustrations*.

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THIS book sets down the principles of machine-shop estimating so clearly and concisely that you can put them to use immediately. It teaches you step-by-step how to estimate the time it takes to manufacture specific machined parts, classifying every job into machining and handling operations. It supplies a self-explanatory breakdown of all the elements for each operation and gives the time value established for each. These time values are presented in decimal minutes and are carried out to three places. In addition the book includes: sample estimates for each operation described, tables of variables and constants, and 93 typical problems to assist you in making your own estimates accurately and speedily. 486 illuminating charts, diagrams, tables and photographs are included to illustrate the topics discussed.

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See our Advt. on Page 298 Nov. 6, '47 American Machinist

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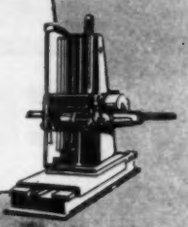

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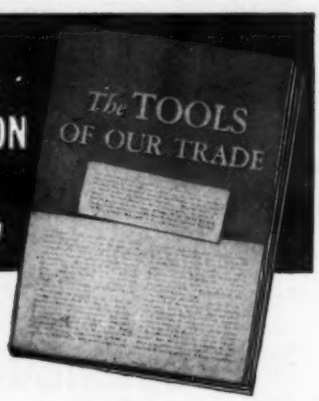

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Smooth table operation is provided through a hardened spiral pinion and rack. The precision *Sealed-for-Life* Ball Bearing spindle is your assurance of fine finishes. Available in bench or floor models. Wet grinding attachment optional at extra cost.

Send for Bulletin A-247

SPECIFICATIONS

Working Surface	5⅝"x10⅜"
Longitudinal Table Travel	12"
Transverse Table Travel	6⅛"
Capacity Under 7" Wheel	9"
Net Weight Floor Model	825 lbs.

Designed and Manufactured by

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MARK IT BEST WITH

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Precision Marking Dies

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NOW! YOU CAN CUT PRODUCTION COSTS!

...WITHOUT NEW MACHINES

Cut chucking time, particularly on irregular or heavy pieces and you cut a big slice out of machining and production costs. Fen Automatic Wrenches cut chucking time as much as 60%. They speed up work by transferring non-productive chucking time to the "production" column.

And they do this on the machines already in your plant! They are attachments, not complete new machines. They are readily applied to lathes, screw machines, thread millers, boring mills, grinders and many other types of standard equipment. They quickly pay for themselves through the increased production they insure.

THE FEN AUTOMATIC WRENCH

BANISH WRENCH WRESTLING

More Pieces Per Hour . . . Every Hour!

By eliminating up to 60% of chucking time (frequently as much as 75% of the total time per piece). FEN AUTOMATIC WRENCHES actually insure more pieces per hour. By reducing worker fatigue, caused by heavy hand chucking these modern porduction tools help maintain the full rate per hour, even in the last hours of the shift.

Variable Torque Motor Regulates Gripping Pressure

Chief feature of the Fen Automatic Wrench is a variable torque motor. A selector wheel enables the operator to select and hold any desired torque from 0 to the maximum capacity of the unit. Thus he may regulate the gripping pressure from an extremely light pressure for thin walled pices to the maximum grip for heavy pieces. A positive action brake applies to either direction of motor operation, preventing "overrun". This is of special advantage where the workpiece restricts the movement of the chuck jaws within close limits. It also allows the operator to "jog" each jaw into proper position in 4 jaw chucking.

Simple and Easy to Operate

A single lever, at the operator's left hand, insures complete control—inserting and withdrawing the wrench spindle and operating the motor to grip or release the workpiece. The right hand is always free to insert and remove the piece. The entire cycle requires but a fraction of the time needed for chucking with a heavy hand wrench.

Step Up Your Production

Put the time-saving, cost-cutting advantages of FEN AUTOMATIC WRENCHES to work on the machines you are operating. They require but a few hours to install and pay off in a few weeks time in faster production and better profits.

SEND THE COUPON NOW FOR COMPLETE DETAILS!

The Fen Machine co.

1350 BABBITT RD.

CLEVELAND 17, OHIO

FEN MACHINE CO., 1301 Babbitt Rd., Euclid, Ohio

Send me complete information on the FEN AUTOMATIC WRENCH.

NAME .....

COMPANY .....

STREET .....

CITY ..... STATE .....

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your business.*

Maybe "more production" isn't the answer to all our problems

AMERICAN INDUSTRY is already producing at almost double its pre-war rate. Yet with labor and material costs at an all-time high, the experts insist that we must produce still more goods, faster, more efficiently, if we are to avoid another boom-and-bust cycle.

We'll buy that—as far as it goes.

But let's never lose sight of the fact that production is only half the problem. Because for every increase in our rate of production, there must be a comparable rise in our *rate of sales.*

Actually, of course, there is no such thing as producing goods at a profit. Goods are *sold* at a profit—yes. And while production line savings are vitally important, it is of equal importance to keep down the cost of *manufacturing sales.*

That is the function of *mechanized selling*—to produce sales on a mass production basis, and at the lowest possible cost per unit. Translated into more familiar terms, it simply means advertising to the right market, in the right way, at the right time.

Like the machine on the production line, good advertising is a multiplier of men's efforts, for it enables us to produce (and *earn*) far more than we could alone. And when it goes to work in business papers — with their tremendous concentration of hand-picked readers—advertising becomes the most efficient machine at our disposal for *manufacturing sales at a profit.*

What are the ten ways to measure the results of your business paper advertising? You'll find the answers in a recent ABP folder, which we'll be glad to send you on request. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, you may have them for the asking.

American Machinist

is one of the 129 members of The Associated Business Papers, whose chief purpose is to maintain the highest standards of editorial helpfulness—for the benefit of reader and advertiser alike.

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SCREW MACHINE PRODUCTS

Multi Spindle ¼" to 2⅝" Diameter. Punch Presses to 50 Ton. Turret and Engine Lathes. All secondary operations. Drill Press, Riveting & Soldering, Packaging & Assembling.

Send us your prints or samples for quotations.

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Accurate Lead *Send Print*

Universal Thread Grinding Co.

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Capacity in the Southwest

Manufacturer of trade marked products has open capacity on 2⅝" capacity Acme Gridley 8 spindle Automatic, Brown & Sharpe Automatics, and equipment for secondary operations. Ample space for assemblies or sub-assemblies in modern plant.

NATIONAL GAS EQUIPMENT CO., INC.

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SCREW MACHINE PRODUCTS

Multi Spindle ¼" to 2⅝" Diameter. Punch Presses to 50 Ton. Turret and Engine Lathes. All secondary operations. Drill Press, Riveting & Soldering, Packaging & Assembling.

Send us your prints or samples for quotations.

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SEND B.P. FOR MFG. COMPLETE ASSEMBLIES

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POSSY'S TOOL & MFG. CO.

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SCREW MACHINE SPECIALISTS

- 1/32" to 1⅜" Dia. Cap.
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- Hand Screw Machines
- Equipped for All Secondary Operations
- Send Prints or Samples for Prompt Quotations

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1935 UNION RD.

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CONTRACT WORK DEPARTMENT

AMERICAN MACHINIST
330 W. 42nd St., N. Y. 18, N. Y.

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For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.

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POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

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BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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NEW ADVERTISING received by 10 A. M. November 18 will appear in the issue of December 4th subject to limitation of space available

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

PRODUCTION FOREMAN for sheetmetal department wanted by manufacturer of commercial refrigerated food storage equipment. Applicant must be experienced with power press operation and high production methods. Ace Cabinet Corp., 278 Bellville Ave., New Bedford, Mass.

GENERAL MANAGER . . . Nationally known manufacturer of small cutting tools seeks General Manager with sales engineering background in the small or large tool field. Must have proven record of success in sales management with emphasis on product improvement, development and new products. Salary and bonus $17,000 to $20,000. Age under 45. Engineering degree preferred. P-2985, American Machinist.

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 259

CHIEF DIE ENGINEER

Large old-established *die jobbing shop* (non-manufacturing) requires widely experienced top-notch die designer to originate die designs, supervise three die draftsmen, and make time estimates on die jobs—on all types of metal stamping and plastic mold dies. Must have had background of actual diemaker. Age 40-50. Location New York City. Write in full detail and in confidence, including salary desired. Only first class, top-notch men with excellent jobbing background should reply.

P-2071, AMERICAN MACHINIST

330 W. 42nd St., New York 18, N. Y.

PLANT MANAGER

M.E. Grad; Top Flight administrator

EXPERIENCED: Line assembly, Ordering Dies, Labor Relations, Purchasing all materials, Machine Shop operations, Machine Tooling.
Must have held Executive position with company mfg. precision equipment, locate Maryland.

IF YOU'RE THE MAN YOU CAN NAME YOUR SALARY

ELLIS SERVICE, 500 5th Ave., N. Y. 18, N. Y.

WANTED GENERAL SUPERINTENDENT

Long established drop forge plant located in the East offers an unusual opportunity to an experienced, technically trained man of proved ability, who is thoroughly familiar with die design, heat treating, hammer and machine shop operations, estimating, etc.

Apply by letter, giving all details as to experience, references, and salary expected. If possible, include recent snapshot. All applications will be held in strictest confidence.

P-1980, AMERICAN MACHINIST

520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS AVAILABLE *for* THREE TOP FLIGHT MACHINE TOOL DESIGNING ENGINEERS

having initiative, originality, creative ability in the designing of heavy machine tools. Advancement to supervisory position possible. Mechanical engineering degree preferable. Salary open. Location southern Ohio. *Reply is confidential.*

P-2721, AMERICAN MACHINIST
520 N. Michigan Avenue **Chicago 11, Illinois**

REPLIES (Box No.):
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NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EMPLOYMENT SERVICE

SALARIED POSITIONS $2,500-$25,000. This thoroughly organized confidential service of thirty-seven years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a precedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dunn Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

MANUFACTURING EXECUTIVE desires position as Works-Plant or Factory Manager, American, 50 years. Wide varied experience in aircraft, automotive, machine tools, machine and diemaking. General jobbing, foundries, structural steel, stampings. Held positions as work, plant, and factory manager, general superintendent; master mechanic, tool superintendent. Strong and rapid increase in production. Practical tool and diemaker, technical education. Thoroughly versed in handling organized labor, grievances and negotiated contracts. Last three positions have tripled gross output. Right connection more desirable than salary. PW-2627, American Machinist.

CHIEF INSPECTOR willing to work as first class inspector or precision assembler. Engineering background. Supervising and mac. operation. Accustumed to close tolerances. Lay-outs, tools, fixtures, 20 years' exp. Own latest prec. tools. Best references. W. Basch, 224 West 72nd St., N. Y., TR 4-4281.

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SUPERINTENDENT-MANAGER. 25 years mechanical shops. 15 years as shop supt., manager, at present employed as Supt. machine shop tool and die, punch and blanking press department. Knows production and semi-production. Fully experienced job shop, incentive system, excellent organizer for production and training for production. Good reference. PW-2761, American Machinist.

GEAR AND Production engineer, 12 years' experience in gear engineering, tooling processing and misc. production of jobbing, machine parts. PW-2185, American Machinist.

BUSINESS OPPORTUNITY

Mechanical Engineer

with 20 years shop, design, and sales experience. Wishes to invest $15,-20,000 in small going business where services can be used to advantage. BO-2816, American Machinist.

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Patent Practice

before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 453, 815-15th Street, N.W., Washington 5, D. C.

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Well established representative desirous of contacting leading American manufacturer interested in representation and distribution in India and Burma. Excellent bank references.

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B. D. BROOKS, INC.
361 Atlantic Ave., Boston, Mass.

MATTISON HIGH POWERED PRECISION SURFACE GRINDERS

14 x 16 x 60 and 24 x 24 x 120

Equipped with Taft-Pierce Fine Mesh Super Power, Flat Magnetic Chucks, extra wheel sleeve, water filter, balancing arbor with stand, guards, pumps, motor generators for chucks and with all motors and electrical starting equipment.

USED ABOUT 100 HOURS

Buy for balance due while still under new machine guarantee.

AUSTIN-HASTINGS CO., INC.
226 Binney St., Cambridge, Mass.

A.C. MOTORS AND GENERATORS

1½, 2 & 3 Horse Power sizes only, single phase Repulsion Induction, 110-220. Also totally enclosed 3 Phase Motors 1½, 2, 3 & 5 H.P. Mfrs. of A.C. Generators, Rotary Converters, Lighting Plants, Frequency Changers and High Frequency Generators.

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1423 First Ave **Mankato, Minn.**

HYDRAULIC SURFACE GRINDER

Hill-Acme, Vertical Spindle, 40 H.P. Motor, 220 Volts, 60 cycle 3 phase, 26" diameter-cup wheel 18"x60" Magnetic Chuck.

New in 1942. Excellent condition.

LAFAYETTE SAW & KNIFE, INC.
115 BANKER STREET
BROOKLYN 22, N. Y.
Phone EVergreen 8-5973

FOR SALE
MILLING MACHINES

Six #000 Brown & Sharpe Brand New, Original Crates With 220 Volt 60 Cy. 3 Ph. Motors.

E. M. OLDACH CO., INC.
BOURSE BUILDING PHILA. 6, PA.

WANTED

WANTED

PUNCH PRESS

Capacity approximately 200 to 300 tons. Bed area 30" or over—front to back. Bed area 60" or over—right to left. 24" shut height. Prefer 10" to 12" stroke.

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A. V. Rowe, Pres.
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MACHINERY COMPANY

18 WARD ST.
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N. Y.

Every Item Guaranteed as Represented

AUTOMATICS

#0 & #00 Brown & Sharpe Full Automatic, Standard Speed

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle

1—#515 National Acme 9/16" 4-spindle Automatics, complete

ENGINE LATHES

32"x28' Bridgeford, Geared Head
32"x16' Bridgeford, Geared Head
28"x10' Davis, Quick Change Gear
26"x18' Bridgeford Geared Head
24"x36' New Haven, Motor Drive
24"x22' Lodge & Shipley, Geared Head
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G.
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Lodge & Shipley geared head
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Drive
16"x6' Lodge & Shipley Geared Head
14x8' Rockford, Q.C.G. Collets
14"x8' Pratt & Whitney, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' American, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x3' Craftsman, Bench, M. Drive
11"x4' Sidney, Q.C.G. Floor Type
11"x3' South Bend, Q.C.G. M. Drive
10"x24" Logan, Q.C.G. (new) in stock
9"x12" Sundstrand Mfg. Type
8"x18" Rivett Precision, Bench
9"x15" Porter-Cable, Production

TURRET LATHES

Morey #2 Geared Head, 1" Cap.
Simmons, Microspeed, 1" Cap.
W-Swasey, Univ. #4, 1½" Cap.
Gisholt #4, Univ. 2" Cap.
W-Swasey #2A, Univ. 2½" Cap.
Gisholt #5, Univ. 2½" Cap.
W-Swasey #3A, Univ. 3½" Cap.
Bullard 42" Vert. Turret

GRINDERS

#2 Cinci. Univ. Tool & Cutter
#1 B&S, 10x24, Univ. Cylindrical
"A" Norton, 10x18 Cylindrical
"A" Norton, 10x72 Cylindrical
"A" Norton, 10x84 Cylindrical
#2 Norton, 10x32 Univ. Tool & Cutter
#11 B&S 10x30 Cylindrical
#10 B&S 6x18 Cylindrical
#4 B&S Univ. 12x60 Cylindrical
#12 Greenfield, Internal Hydromatic
#70 Heald, Internal, Grinds 11" deep
#2 Cinci. 6x36 Univ. Cylindrical
#2 Cinci. Centerless, Motor Dr.
#51 Oliver, Drill Pointers, 1½" cap.
24" Blount Wet Grinder
Besley Dble. End Disc, 30" Discs
#2 B&S Automatic 6x18 Surface
96" Seybold, Knife Grinder
Blanchard #16 Vertical, M. Dr.
Gorton Dble. End, 18" Discs
Pratt-Whitney 14x36 Vert. Surface
Abrasive #33 Vert. Surface, Automatic
#2 B&S Face Grinder, M. Drive

SHEARS & METAL WORKING

Cerweco, 8'x12 ga. Brake
Wais & Roos, 10½'x¼" Gap Shear
Niagara, 6'x18 ga. Squaring Shear
Lown, 6'x16 ga. Slip Rolls, M. Dr.
Lennox Splitting Shear, ¾" Cap.
Lennox Bevel Shear, ¼" Cap. M. Dr.
Peckstow, Power Seaming Machine
Racine 6x6 Shear-Cut Hack Saw

MILLING MACHINES

#2 Van Norman Horiz. Knee Type
#3 Cinci. Vertical, Dial Type
#1M Kent-Owens, Horiz. Mill
#1½B Milwaukee, Dble. Overarm
#2B Milwaukee, Dble. Overarm
#3B Milwaukee, Dble. Overarm
#2B Milwaukee, Univ. Horiz.
#2 Cincin. Univ. Horiz.
Cinci. 36x72 Hydrotel
#2 Van Norman, Duplex Mill
#4 Cinci Vert. High Power
#2 Kempsmith, Horiz. Plain
#1 Kempsmith, Horiz. Plain
#5C Becker Vertical Mill
#3, #4, #5 Cinci. Horiz. Mills.
#31 Lucas, Horiz. Boring, 3" Bar
#0 Giddings & Lewis, Horiz. Boring Mill—3" Bar

DRILLING MACHINES

Natco #12, 20 Spdles. 3/16" Cap.
Natco #D6, 24 Spdles. 5/16" Cap.
Natco #D5, 14 Spdles. 5/16" Cap.
Fox #15, 54 Spdles. #1 m.t.
Minster #2D, Sgle. Spdle. Upright, compound table, #5 m.t.
Cinci-Bickford, 3½' arm, 9" col. Radial
Cinci-Bickford, 4' arm, 11" col. Radial
Cinci-Bickford, 5' arm, 13" col. Radial
Fosdick, 5' arm, 14" col. Radial
Cinci-Bickford, 6' arm, 15" col. Radial

SHAPERS & PLANERS

Pratt-Whitney Vert. Shaper, 6", M. Dr.
Logan 7" Horiz. Shaper, Motor Drive
Machinery Sales 16" Crank Shaper
Gould & Eberhardt 16" Crank Shaper
Gould & Eberhardt 24" Crank Shaper
American 24" Crank Shaper
New Haven 12" Vertical Shaper
Whitcombe, 24x24x6 Planer
Niles-B-P, Shaper-Planer, 20x20x24
Gray, 26x26x8' Planer
Betts, 120"x72"x35' Planer
Ingersoll Planer Type Mill, 30x30x12

POWER PRESSES

Standard #1 "A", 6 tons, floor type
Bliss #68C Double Action Press
Hilles & Jones #4 Single End Punch & S Shear, 48" Throat, equipped as Plate Shear with 18" Blades, Cap.—1¼" thru 1"
Bliss #76½B, Single Crank Geared Press, 7" Shaft, 3" Stroke
Horton-Ackerly, 6 tons Bench Presses
Caldwell, 200 Tons, Hydraulic, Horizontal Wheel Press
Lucas 15 Tons, Power Arbor Press
Bliss-Consolidated #163B, S.S. Dble. Crank Press—Bed 42"x24"
Clearing 200 Tons, S.S. 10" Stroke
Federal #5 O.B.I. 49 Tons, M. Dr.
Michigan O.B.I. 36 Tons Cap.
General 8 Tons, Flexible Power Press, M. Dr.
Ferracute #EG52 Geared Coining Press, 150 Tons Cap.
Baxendale O.B.I. 11 Tons, 1½" Stroke
Zeh & Hahneman, Single Action Cam Press, Spring Return Type

LATHES

8"x15" Sundstrand, Model C
8"x15" Sundstrand, Model D
10"x22" Sundstrand, Model AA
12"x16" Lipe Carbo, Motor Drive
12"x5' Sebastian
14"x8' Hendey
18"x6' American Grd. Hd.
20"x10' Lodge & Shipley
20"x25" Fay
22"x48" Centers Monarch (1942)
24"-48"x14' cc Rahn-Larmon Gap Lathe
36"x30' Lodge & Shipley Triple Geared Head, two carriages
50"x17' cc LeBlond Geared Head

MILLING MACHINES

No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. Dial Type
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical (1942)
24" Cincinnati Production
No. 2—16" Cin. Auto. R. and F. (1941)
No. 4—48" Cin. Hydro. Tracer Control (1942)
No. 5—48" Cin. Hydro. (1942)
No. 45—48" Cin. Hydro. Duplex Tracer (1943)
No. 56-90 Cin. Hydro. (1943)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
6"x36" Lees-Bradner Thread Miller
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

ReMANUFACTURED MACHINE TOOLS
-(ORIGINATED BY US)-
Reg. U.S. Patent Office

DRILLS

No. 121 Baker
No. 217 Baker—(1943)
No. D-8 Colburn No. 6 M. T.
No. 2 LMS—26"—1 Spdl. L-G (1944)
No. 2 LMS—20"—2 Spdl. L-G (1944)
No. 2 LMS—26"—2 Spdl. L-G (1945)
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—14"—4 Spdl. L-G
No. 4 BM—24"—4 Spdl. Fosdick
No. 2 LMS—26"—4 Spdl. L-G
No. 2 LMS—26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
3'-11" Col. Cinn.-Gilbert
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS

34" King
36" Rogers
42" Bullard New Era
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HOR. BOR. MILLS

No. 31—3" Bar Lucas
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES

No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

PLANERS

36"x36"x12' Cincinnati, 4 Heads

MISCELLANEOUS

Model H-7 Micromatic Vert. Honer
2500 Ton Lake Erie Hydraulic Press
No. 22-C Racine Shear Cut Hack Saw

TURRET LATHES

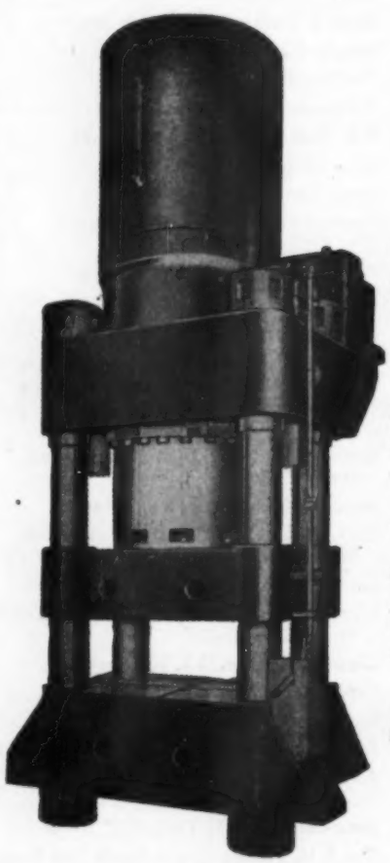
No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson (1942)
No. 4 Gisholt (1942)
No. 5 Warner & Swasey, air chucks (1941)
No. 5 Bardons & Oliver
No. 5 Foster, A.C. & Bar Feed
2-A Warner & Swasey
6R Denver
18" Libby, 3½" H.S.
No. 49-675—New Britain Gridley—7½" Cap.

GRINDERS

6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C Plain (1943)
16"x72" Norton Type C Plain (1943)
Norton Motor Driven Plain Grinders 6"x18" to 24"x240"
10"x24" Landis Type C Universal
12"x36" Landis Type LCH Universal (1945)
12"x48" Cincinnati Universal
16"x16"x48" Thompson Hydr. Surface
No. 22—12" Heald Rotary Surface
No. 25—16" Heald Rotary Surface (1942)
10"x72" Colonial Broach Grinder
No. 49 Excello Carbide Tool Grdr.

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BLVD. **CHICAGO 6, ILL.**



1300 TON WATSON STILLMAN HYDRAULIC PRESS
Self Contained

Platen size 48" x 42". Stroke 22". Opening 37. Ram Diameter 35". Driven by 50 H.P. Motor, Also

600 TON ELMES PRESS

Self contained 48x45" between rods, 36" stroke, 66" openings, 75 H.P. motor, 3 phase, 60 cycle, 220v.

1320 TON PRESS, SELF CONTAINED

600 Ton Self Contained Lake Erie Double Action Press with 175 Ton Cushion Cylinder. Distance between rods 48"x60", Stroke 30", opening 48".

Aaron Machinery Co.
Incorporated
45 CROSBY ST., N. Y. C.
Tel. CAnal 6-0421

UNUSUAL VALUES

Milling Machines—#1, Universal, #1 American (new) plain, #1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe #3—26", Gould & Eberhardt 42".

Grinders—Cylinder, B & S #11, Planer type 16"x36", Surface 13"x62", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x6', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized. Large stock 10" and 12" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 36", 40".

SPECIAL—New totally enclosed, dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

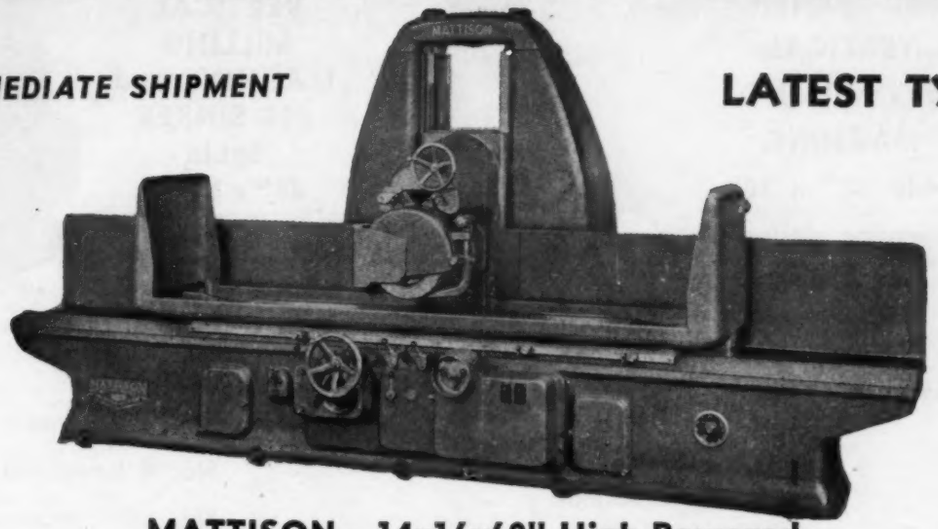
Drill—Foote-Burt #25—24" Hi Duty. 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—12"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. BOX 88, COLUMBUS 16, OHIO

LATEST TYPE NEARLY NEW MACHINES

IMMEDIATE SHIPMENT — **LATEST TYPE**



MATTISON—14x16x60" High Powered Precision Surface Grinder—Hydraulic

Equipped with guards, pumps, tank, piping, diamond holders. Arranged for motor drive with motors and electrical starting equipment.

BORING MILLS—Horizontal

DETRICK & HARVEY 4", 5" bar, Floor Type
GIDDINGS & LEWIS #32—3⅜" bar, latest type
LANDIS #35 3½" bar, Floor Type
NILES BEMENT POND 4½" bar, Motor Drive
NILES BEMENT POND 5", 6", 7" bar, floor type, M.D.

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC, M.D.
BETTS (Consolidated) 84"—3 heads, AC, Latest
BULLARD 16"—6 spindle Mult-Au-Matic—Type D—Single indexing—Latest Type
BULLARD 24" New Era, vert. turret, M.D.
BULLARD 36" New Era, Vertical Turret, M.D.
BULLARD 54" Maximill, 2 swivel hds., M.D.
KING 36" Vertical Turret, M.D., Latest Type
NILES 62", 75", 100", swivel heads—PRT, Motor Drive

BROACHES

LaPOINTE 4L, Horiz., hyd., latest type
LaPOINTE #SRV-25-66, 10-54, Vertical Surface, hyd., latest type

DRILLS

AMERICAN 3'11" Hole Wizard Radial—Latest Type
BAUSH #3, #4 Adj. multiple spindle, M.D.
CARLTON 6'15" Ball Bearing, Radial—M.D.
WESTERN 5'18", 6'20" Radial—Latest Type
NATCO B4A—Multiple Spindle, Hyd.—Latest Type
NATCO B4B—adj. Multiple Spindle—Hyd.—Latest
NATCO Model D5—Adjustable Multiple Spindle—Latest

GEAR CUTTING EQUIPMENT

BARBER COLMAN #3 hobber, latest type
BROWN & SHARPE No. 3H gear cutter, M.D.
FELLOWS #64, 615A, 645A3, 7, 7A, 72, 75A, 77, High Speed Gear Shapers, latest type
GLEASON 11", 18" bevel generator M.D.
GLEASON 12" Straight Bevel Generator, Latest Type
GOULD & EBERHARDT 12HS Hobber, latest
GOULD & EBERHARDT 36H, with diff., M.D.
GOULD & EBERHARDT 48H universal hobber, latest type
PRATT & WHITNEY 40" Grinder, hyd., latest
SCHUHARDT & SCHUTTE #1, #2 with diff., M.D.

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, latest type
CINCINNATI 6x18 plain Model EA, latest type
LANDIS 4x18, Type H, hyd., latest type
LANDIS 6x18 Type "C", Hyd., Latest Type
LANDIS 30x220" Plain, Roll, Motor Drive
NORTON 10x18 Type C, hyd., latest type
NORTON 16x72" Univ., Hyd., Type C, latest
NORTON 16x72" Plain Type "C", latest type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hyd.—latest type
BLANCHARD #11—16" chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
BLANCHARD No. 16A—Dial Type—motor drive
BLANCHARD #18—30" chuck, latest type
BLANCHARD #27-18 M.D., Latest Type
GALLMEYER & LIVINGSTON #35, 8x24" Hyd., latest
GALLMEYER & LIVINGSTON #55, 12x36" hyd., latest
HEALD #22, 12" chuck, Rotary, latest type
NORTON 10x36 Hyd., Latest Type
NORTON 6"x18"—Hyd.—Latest Type
THOMPSON 8x12x24 Hyd., latest type
THOMPSON 16x30x48 Hyd., Latest Type

JIG BORER

PRATT & WHITNEY 3B, Motor Drive, latest

LATHES—Engine and Mfg.

BETTS BRIDGEFORD 60"x24' bed, swing 84"
BRIDGEFORD 36"x28', 36"x32' bed—2 car., M.D.
HENDEY 14"x54" centers, geared, engine, M.D.
HENDEY 12"x30" centers, TIMKEN, latest type
JONES & LAMSON "Fay" 20x25" automatic, TIMKEN, latest type
LEBLOND 13"x4', 17"x5', 17"x14' bed, Rapid Production, Timken Bearing, latest type
LEHMAN 16"x30" centers, hydratrol, TIMKEN, latest type
LODGE & SHIPLEY 16/20"x30" centers, Timken bearing, latest type
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, latest type
MONARCH 36x108" Centers, Timken, latest type
MONARCH 12"x30" centers, Timken, Latest type
MONARCH 16"x28" centers, geared, M.D.
NILES 42"x60", double head, motor drive
NILES 48x35' centers, Heavy Duty, 2 carriage, Timken Bearing, PRT, Latest Type
NILES 60x10', 35', 40' centers, 1 or 2 carriages, Timken Bearing, PRT, Latest Type
NILES 72"x62' centers, combination Boring and Turning, Motor Drive
NILES 30x50' Boring, Timken, Latest Type
REED PRENTICE 20x54" Centers, Timken, latest type
REED PRENTICE 27"x15', 20' centers, M.D.
REED PRENTICE 16x24" centers, geared, M.D.
SPRINGFIELD 14"x43" centers, geared, MD
SPRINGFIELD 16"x24" centers, geared, MD
SUNDSTRAND 8x15", 12x22" stub, automatic, TIMKEN, latest type
WARD HAGGAS & SMITH 18/36"x10' bed, Gap

LATHES—Turret

CINCINNATI ACME No. 1, No. 5W, Latest Type
GISHOLT #3, 5, Univ., Timken, Latest Type
GISHOLT #1L, #2L, Universal, Timken, Latest
JONES & LAMSON #3, 7C, 8A, Universal, Timken Bearing, Latest Type
LIBBY 1H-5, 5½ hole, Timken, Latest
MOREY No. 2G, No. 3, No. 4, Timken, latest
POTTER & JOHNSTON #5D2E, 5DE, TIMKEN, latest type
WARNER & SWASEY 3A, Universal 6" bar capacity, Timken Bearing, Latest Type
WARNER & SWASEY #5, Univ., Latest
WARNER & SWASEY #1A, 4A, Univ., Latest

MILLING MACHINES—Mfg.

CINCINNATI, 24", 48" duplex, TIMKEN, M.D.
CINCINNATI 3-24 Duplex Hydromatic, latest type
INGERSOLL 32x24x16' Planer Type, 2 heads, AC, M.D.
TAYLOR & FENN M-80 Duplex, Spline, latest type

MILLING MACHINES—Plain

BROWN & SHARPE #12 Timken Bearing, latest
CINCINNATI 1-12, 2-24 Timken, latest type
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI #2, #3 Dial Type, Timken, latest
CINCINNATI #4, 4S, 5, Timken Bearing, M.D.
CINCINNATI 08 Automatic rise and fall, Timken, Latest Type
KEARNEY & TRECKER #4 heavy, TIMKEN, latest
KEARNEY & TRECKER 1218 TIMKEN, latest type
KEMPSMITH #2, Model G, Timken, Latest
KEMPSMITH No. 4 Maximiller—Timken—latest

MILLING MACHINES—Vertical

CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
CINCINNATI No. 3, No. 4 High-Powered, M.D.
GORTON #8D superspeed, latest type
GORTON #9J superspeed, complete with duplicator, latest type
REED & PRENTICE 3VG with Hydraulic Duplicator, Timken Bearing, latest type
REED PRENTICE #5 die sinker, TIMKEN, latest

MISCELLANEOUS

BARNES #172, 306H Vertical Hone, Latest
BIRDSBORO 350 ton vertical hyd. press, latest type
DoALL V-36, Saw—Latest Type
FERRACUTE DG-55, 75 ton Drawing Press, Tie Rod, 17" stroke, Latest Type
LANDIS 1" Bolt Threader—Latest Type
MORTON 60" traveling head, planer, miller and driller
PRATT & WHITNEY "Keller" Type G, Type BL2416—Latest Type
JONES & LAMSON 6x15", 8x18" thread grinders, latest type

PLANERS

CHANDLER 36x36x20', 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84x84x18', 4 heads, DC, M.D.
LIBERTY 24x24x8', 2 heads, AC, VARI-VOLTAGE, latest type
NILES BEMENT POND 48x48x16', 2 heads, AC, M.D.
OHIO 42x42x20'—2 heads, AC, M.D.

SHAPERS

LAMAIRE 18' Vert. Hydraulic—latest type
LYND FARQUHAR 26" Openside, Motor Drive
MOREY 8", 10", 12", 14" Vertical, latest type
MORTON 48" Draw Cut, Motor Drive
PRATT & WHITNEY 6' 10" Vertical, M.D.

Available for Prompt Shipment • Most Built After 1941

(Partial List) Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

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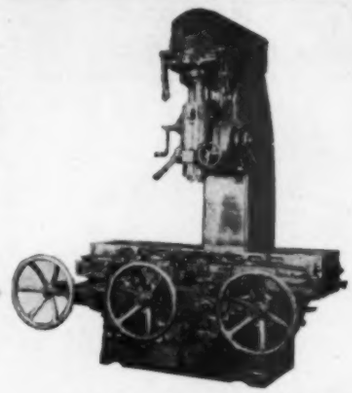
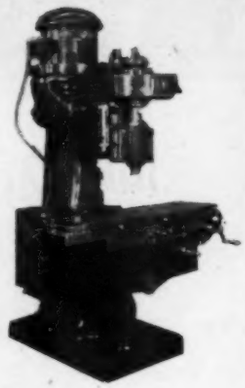
EMERMAN

No. 5
REED-PRENTICE
VERTICAL
JIG MILLING
MACHINE,
table 68" x 16",
motor drive



No. 3 VG
REED-PRENTICE
VERTICAL
MILLING
MACHINE and
DIE SINKER
table
44" x 10½"
motor
drive



ALL SIZES UNIVERSAL & PLAIN MILLS

VERTICAL MILLS

No. 08 Cincinnati
No. 1 Brown & Sharpe
No. 2 Cincinnati
No. 2½B Milwaukee
No. 3 Cincinnati
No. 3 Brown & Sharpe
No. 4 Cincinnati
No. 4 Kempsmith
No. 4K Milwaukee
No. 5 Becker
No. 6 Becker

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EMERMAN MACHINERY CORP.

875 W. 120th STREET — CHICAGO 43, ILLINOIS

NEW SURPLUS

HIGH SPEED PLAIN & SIDE MILLING CUTTERS

H.S. PLAIN CUTTERS

3"x ¼"	x1"	$2.00 ea.
3"x5/16"	x1"	2.16 ea.
3"x ⅜"	x1"	2.28 ea.
3"x ½"	x1¼"	2.60 ea.
3"x ⅝"	x1¼"	2.76 ea.
3"x ¾"	x1¼"	3.00 ea.
3"x ⅞"	x1¼"	3.24 ea.
3"	x1¼"	3.48 ea.
3"x1¼"	x1¼"	3.86 ea.
3"x1½"	x1¼"	4.40 ea.

H.S. SIDE CUTTERS

2½"x¼"	x ⅞"	$2.16 ea.
3"	x5/16"x1"	2.60 ea.
3"	x⅜" x1"	2.88 ea.
3"	x7/16"x1"	3.00 ea.
4"	x¾"	x1¼" 5.00 ea.
4"	x⅜"	x1¼" 5.70 ea.
5"	x⅝"	x1¼" 7.00 ea.
5"	x¾"	x1¼" 8.00 ea.
5"	x⅞"	x1" 10.00 ea.
5"	x1"	x1" 10.00 ea.

VICTOR MACHINERY EXCHANGE, INC.

251 Centre St. — New York City
CAnal 6-5575

SPECIAL LOW PRICED PLANERS IN STOCK

1—Used 30"x30"x8' Gray single head planer having motor drive mounted on top with motor for 220/3/60 A.C. Price $450.00

1—Used 20"x24"x6' Cincinnati single head geared drive planer having counter shaft for belt drive. Price $250.00

1—24"x24"x8' Whitcomb second belt drive planer with single head and having motor drive. Price ... $600.00

1—Used 32"x32"x12' Gray double head planer with geared drive and 5 H.P. motor drive mounted on top of machine for 220/3/160 A.C. Price $950.00

REYNOLDS MACHINERY CO.

303 Eddy Street, Providence 3, R. I.
Gaspee 5187

PUNCH PRESSES

IMMEDIATE DELIVERY FROM STOCK

Brand new inclinables, immediate delivery, 40, 50, 70, and 90 ton. Walsh, Federal.

#4½ Bliss, 80-100 ton rated cap. 21x27 bed, 4½" stroke, with all accessories, latest design, 30, 88, 110 (optional) strokes per min.

#6 Bliss, 90-125 ton rated cap. 25x30 bed, avail. in 4½" and 5½" stroke, with all accessories, latest design, 30, 88, 110 (optional) strokes per min.

35 and 40 ton rated cap. Toledo Horning Presses, 2", 4½" stroke.

12' ⅜" and 10' ½" Power Press brakes.

Brand new 4½ ton OBI Presses, reduced to $165.00 ea. New 15 ton reduced to $363.00 ea.

10' ¾" 10'⅛" Power Squaring Shears.

BUTT & SPOT WELDERS, IMMEDIATE DELIVERY 5-300 KVA, BRAND NEW.

PAULS MACHINERY COMPANY

MONA MOTOR

6103 Vermont Avenue
Detroit 8, Michigan
TYLER 76300

POWER SHEARS

96", 14 ga. cap.
72", 10 ga. cap.
52" & 72", 14 ga. cap.

Aaron Machinery Co., Inc.
45 CROSBY ST., N. Y. C. — Tel. CAnal 6-0421

THE LARGEST MACHINE TOOL PLANT IN THE U.S.A.

Eastern OFFERS FROM STOCK

DEVOTED EXCLUSIVELY TO REBUILT MACHINERY

EASTERN REBUILT MACHINE TOOLS FOR IMMEDIATE SHIPMENT

ENGINE LATHES

12"x84" centers Lodge & Shipley, m.d. in base, taper
13"x30" centers Pratt & Whitney Model B, m.d. in base, taper
13"x48" centers Pratt & Whitney Model B, m.d. in base, taper
14"x30" centers American Pacemaker, m.d., latest type
14"x30" centers Lodge & Shipley, m.d. in base, latest
14"x54" centers Hendey, m.d. in base, taper, collets, latest
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' Pratt & Whitney, cone, taper
14"x6' Sidney, m.d. in base
14"x8' Pratt & Whitney, cone
16"x30" centers Pratt & Whitney, m.d. in base
16"x6' Bradford, cone
16"x6' Hendey Geared Head, m.d.
16"x6' Lodge & Shipley Selec. Head, m.d.
16"x30" centers Lodge & Shipley, m.d. in base, taper, latest
16"x30" centers Monarch, m.d. in base
16"x8' Lodge & Shipley Selec. Head, m.d., taper
17"x8' LeBlond, cone
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d., taper
18"x8' Champion, cone
18"x8' Hendey Geared Head, taper
18"x8' Lodge & Shipley, cone
19"x10' LeBlond Geared Head, m.d.
20"x48" Reed-Prentice Geared Head, m.d., taper
20"x8' Cisco, cone
21"x12' LeBlond, cone, taper
21"x18' LeBlond, cone
22"x70" centers Greaves-Klusman Geared Head, m.d., taper
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American, cone
24"x10' Greaves-Klusman Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x144" centers American Geared Head, m.d., taper, latest type
24"x12' Reed-Prentice Geared Head, m.d., taper
24"x14' Boye & Emmes, cone, taper
24"x20' Lodge & Shipley, cone, taper
26"x16' Boye & Emmes, m.d., taper
27"x18' LeBlond Geared Head, m.d.
36"x12' Lehmann Geared Head, m.d., taper, latest
36"x21' centers Putnam Geared Head, m.d.
36"x28' centers Niles H.D., m.d., p.r.t., 2 carriages, latest
36"x30' Lodge & Shipley Selec. Head, m.d.
36"x32' centers Putnam Geared Head, m.d., 2 carriages
50"x204" centers LeBlond H.D. Geared Head, m.d., taper, latest

PLAIN MILLING MACHINES

No. 000 Brown & Sharpe, m.d., latest
No. 0-8 Cincinnati Plain Automatic, m.d.
No. 1A Milwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 2 Cincinnati, cone
No. 2B Brown & Sharpe, m.d. in base, latest
No. 2 Cincinnati High Speed Dial Tipe, m.d., latest
No. 2L Cincinnati, m.d. in base
No. 2MH Cincinnati, m.d. in base, latest
No. 2HL Milwaukee, m.d. in base, latest
No. 3B Brown & Sharpe, m.d. in base, latest
No. 3S Cincinnati, m.d.
No. 3 Oesterlein, cone
No. 4B Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4 Cincinnati H.S. Dial Type, m.d. in base, latest
No. 5 Heavy Brown & Sharpe, m.d.
No. 5 Cincinnati High Power, m.d., Timken
No. 5 Heavy Duty LeBlond, s.p.d.

UNIVERSAL MILLING MACHINES

No. 4A Brown & Sharpe, m.d.
No. 4G LeBlond H.D.

SAWS

9x9" Peerless Hack, belt
7½ H.P. Cincinnati Elec. Tool Abrasive Cut-off Machine, type JCAW
No. 3 and 8 Nutter & Barnes Cold
No. 6 Cochran-Bly Cold
No. 11½ Higley Cold
Gustav Wagner Cold, m.d., 28" blade
No. 138 Espen-Lucas Cold, 30" blade

MANUFACTURING TYPE MILLING MACHINES

No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
No. 00 Sundstrand Hydraulic Feed Rigidmill, m.d., latest
No. 0-8 Cincinnati EA Plain Automatic, m.d., new Type P Ohio Mfg. Type, m.d.
No. 1-12 Cincinnati Plain Automatic, m.d.
No. 1-18 Cincinnati Plain Automatic, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., latest (2)
No. 2-24 Cincinnati Plain Automatic, m.d., with rise and fall attachment, latest (3)
No. 2 Sundstrand Electromill, m.d., latest
No. 3A Sundstrand Copy Rigidmill, m.d.
No. 3-24 Cincinnati Plain Hydromatic, m.d., latest
M24 Milwaukee Simplex, m.d., latest
No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, m.d., with tracer, latest
CT-36 and CT-54 Lees-Bradner Thread, m.d., latest
10x24" Hanson-Whitney Thread, m.d.
18" Cincinnati Mfg. Type, m.d.
18", 24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
48" Cincinnati Duplex Automatic, m.d.
Hall Planetary Thread, m.d.
4" Pratt & Whitney Spline, m.d.
4½x12", 6x14", 6x20", 6x48", 6x80" Pratt & Whitney Thread, m.d.
24"x6' Ingersoll Slab, m.d.
30"x36"x12' Ingersoll Slab, m.d., 2 rail heads
36"x24"x8' Ingersoll, m.d., 1 rail, 2 side heads
Burr Mfg. 72x11" table
No. 2 and 12 Pratt & Whitney Lincoln Type

VERTICAL MILLING MACHINES

No. 2, 3, 4 Cincinnati High Speed Dial Type, m.d. in base, latest
No. 2 Cincinnati Medium Speed Dial Type, m.d., latest
No. 4 Cincinnati High Power, m.d., latest
No. 2H, 4H Milwaukee, m.d., latest
No. 2K, 3K, 4K Milwaukee, m.d., latest
Cincinnati Hydromatic Vertical, 2 vertical spindles, m.d.
No. 2M Cincinnati, m.d.
No. 2, 3, 4 Cincinnati H.P., m.d.
No. 2½B, 3B, 4 Milwaukee, m.d.
No. 3V Van Norman, m.d., latest
No. 3V Toledo, s.p.d.
No. 5 Reed-Prentice, m.d., latest type
No. 5 Brown & Sharpe, cone
No. 5 Jackson, m.d.
No. 28-60 Cincinnati 2 spindle Hydro-Tel., m.d., latest

PLANERS

24"x24"x6' Gray, 1 head, belt
24"x24"x10' Whitcomb-Blaisdell, 2 heads, belted m.d.
30"x30"x12' Cincinnati, 2 heads, belt
30"x30"x14' Gray, 2 heads, belt
32"x32"x16' Gray, 2 heads, belt
36"x36"x10' Niles, 2 heads, belt
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
38"x38"x20' Gray Spiral Drive, 2 heads, belt
42"x42"x26' Gray, 2 heads, belted m.d.
48"x48"x18' Detrick & Harvey, 2 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, belted m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
48"x48"x40' Sellers, 2 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x24' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.
P10 Coulter Crank Type Shaper Planer, 1 head, m.d.

SHEET METAL MACHINERY

Gray Turret Hd. Metal Cutter, 36" throat, ¼" cap.
Southwark Rot. Metal Cutter, 36" throat, ⅜" cap.
120" No. 100 Niagara Heavy Prod. Folder, 16 ga., m.d.

SLOTTERS

6" Model B P. & W. Vertical Shaper, m.d., latest
12" Bement-Miles, m.d.
15" Canada, m.d.
48" Niles-Bement-Pond Geared, reversing m.d.

TURRET LATHES AND SCREW MACHINES

No. 1 Cincinnati-Acme Semi-Universal, m.d., bar
No. 1 Cinn.-Acme Semi-Univ. m.d., chucking
No. 1L Gisholt Univ., m.d., chucking, Timken, late
No. 1L Gisholt as above, long bed types
No. 1A Warner & Swasey Universal, m.d., chucking, preselector head, latest type (2)
No. 1A Warner & Swasey Universal, m.d., chucking
No. 1A Warner & Swasey Universal, m.d., bar
No. 2 Cinn.-Acme Full Univ., m.d., chucking, latest
No. 2 Cincinnati Acme as above, long bed type
No. 2L Gisholt Universal, m.d., chucking, Timken
No. 2L Gisholt as above, long bed types
No. 2 Pratt & Whitney Shaver, m.d.
No. 2 W. & S. All Geared Head, m.d., bar, latest
No. 2A Warner & Swasey, m.d., preselector head, cross sliding turret, bar, latest type
No. 2A Warner & Swasey, m.d., bar
No. 2A Warner & Swsasey, m.d., chucking
No. 2B Foster Universal, m.d., chucking
No. 2G Morey Ram Type, bar
No. 3 Cinn.-Acme Full Univ., chucking, cross sliding turret
No. 3S Cinn.-Acme Fixed Center Univ., m.d., chucking, latest
No. 3 Foster Geared Head, bar, m.d.
No. 3B Foster Universal, m.d., bar
No. 3L Gisholt, m.d., chucking, Timken
No. 3 Warner & Swasey Universal Ram Type, m.d. in base, chucking, latest
No. 3 Warner & Swasey as above, bar
No. 3A W. & S., m.d., chucking, latest type
No. 3A Warner & Swasey, m.d., chucking, Timken
No. 3A Warner & Swasey, m.d., bar
No. 4 Gisholt Universal, m.d., chucking
No. 4 Warner & Swasey Universal, m.d., preselector head, chucking, latest
No. 4 Warner & Swasey as above, bar
No. 4 Warner & Swasey, cone
No. 4 Warner & Swasey Universal, cone
No. 4A Warner & Swasey Universal, m.d., chucking, 8" hole, latest
No. 4A Warner & Swasey, m.d., chucking, 7½" hole, Timken, late
No. 4R Cincinnati Acme, m.d., bar
No. 5 FosterAll Geared Hd. Univ., m.d., Timken, late
No. 4R Cincinnati Acme, m.d., bar
No. 5 FosterAll Geared Hd. Univ., m.d., Timken, chucking
No. 5 J. & L. Univ. Ram Type, m.d., chuck, latest
No. 5 W. & S. Univ., m.d., preselector head, bar, latest
No. 5 Warner & Swasey, as above, chucking
No. 5 Warner & Swasey, older type, Timken
No. 7 Bardons & Oliver Geared Head, bar, m.d.
2½" J. & L. Univ. Saddle Type, m.d., bar, Timken
2½x24", 3x36", 3½x32" Jones & Lamson Flat Turret, bar and chucking types, m.d.
2 spindle 3x36" Jones & Lamson, chucking
3¼" Cincinnati Acme Geared Head, bar
18" and 26" Libby Turret, m.d., chucking
24" and 28" Gisholt, cone

TAPPING MACHINES

No. 1 Bakewell Precision, m.d., latest
No. 2 Bakewell Precision, m.d., latest
No. 5 Webster & Perks 5 spindle Vertical Nut, belt

MISCELLANEOUS

BL-2420 P.&W. "Keller" Machine, m.d., latest type
Gisholt Precision Balancing, m.d.
40" Chip Wringer, m.d., "Tolhurst"
No. 2 Cochran-Bly Filing Machine, belt
No. 11-S Cochran-Bly Saw Sharpener, m.d.
No. 12M Morey 2 spindle Profiler, m.d., latest
Detrick & Harvey 2 spindle Profiler, belt
No. 12 Pratt & Whitney 2 spindle Profiler, belt
Wagner Saw Sharpener, m.d.

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1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

TREMENDOUS STOCK of NEW, USED & REBUILT MACHINERY

36" Monarch Lathe

We Own and Know of Many Complete Plants For Sale

AUTOMATICS
00 & 2G Brown & Sharpe, New
#00G, #0G, #2G Brown & Sharpe—1942, 1944

BORING MILLS
VERTICAL: 24" to 168"
54" Bullard New Era
HORIZONTAL: Defiance 4½"
#31 Lucas
3½" Universal

GRINDERS
SURFACE: #5 Abrasive 14"x48", 1942
Doall Hydraulic, 1942
Norton Hydraulic
CYLINDRICAL: 12"x72" Cincinnati
14"x36" Norton
6"x32" Norton
4"x12" Landis Type H

HAMMERS
Beard Drop: 1000 to 3000 lbs., United, Billing & Spencer
Forge: #1B & #5 Nazel

PRESSES
#60½ Toledo 1200 Ton
215 Ton Clearing
#28B Bliss
#3½C Bliss Toggle
#1½B Bliss Toggle
#6 Bliss Straight side
Lake Erie 1300 Ton Hydraulic, Bed area 60"x80"

LATHES
New Cincinnati Lathes, All Sizes
24"x18' Monarch G.H., M.D.—1943
24"x10' Monarch G.H., M.D.—1942
36"x16' Monarch G.H., M.D.—1943
16"x6' Monarch G.H., M.D.—1943
42"x29' Ledge & Shipley G.H., M.D.
14"x6' Lodge & Shipley G.H., M.D.—1943
12"x6' Hendey G.H., M.D.—1945
42"x34' American G.H., M.D.
42"x16' American G.H., M.D.
16"x10' Hendey G.H., M.D. relieving & taper attachment

MILLERS
#5 Cincinnati—1943 G.H., M.D.
#4 Cincinnati—1936 G.H., M.D. Universal
#3B Brown & Sharpe—1943 G.H., M.D.
#2MH Cincinnati—1943 G.H., M.D. Universal
#2ML Cincinnati—1943 G.H., M.D. Universal
#2HL Milwaukee—1943 G.H., M.D. Universal
#12 Van Norman
#2H Vertical Milwaukee—1942 G.H., M.D.
#2 Cincinnati Vertical—1940 G.H., M.D.
#14 Cochran & Bly Universal G.H., M.D.

PLANERS
96"x96"x26' Cincinnati 4 heads DC, M.D.
16'x10'x75' Niles Bement Pond 4 heads DC, M.D.
48"x48"x12' Woodward & Powell 4 head
48"x40"x10' Whitcomb Planer 2 head
36"x36"x8' American Planer 3 head
36"x36"x18' Cincinnati 4 head
36"x36"x10' Ohio 4 head
42"x42"x24' Rockford 4 head

MISCELLANEOUS
Hot & Cold Rolling Mills up to 84"
Lempco Crankshaft Grinder 32"x90"
#2 & #3 Cincinnati Centerless Grinders
Lester High and Low Pressure Die Casting Machines, 6 lbs & 500# air pressure
New #510 Campbell Abrasive Cutoff Machines, 12" capacity
Moore Jig Borer
#2, 3, 4L LaPointe Broachinge Machines
#61A Fellows Gear Shapers
#155 Pawtucket Bar Cutter
#30 Waterbury Farrel Thread Roller
#2 Bakewell Tapping Machine ⅜" to 1½"
3" Gleason Gear Generator
#5 Waterbury Farrel Header
#2A Manville Slotters
#2½ Waterbury Farrel Header
Pipe & Bolt Threaders up to 18"
10' Hendley & Whitmore Bending Rolls, 12 gauge Pyramid
8' Kling Bending Roll, ¾" Pyramid
#26 Doall Band Saw & Filer
36" Doall Zepher

PUNCH & SHEARS
#20 Pels Universal Iron Worker
#16 Pels Universal Iron Worker
#2½ Buffalo Universal Iron Worker
13½"x⅜" New Hyde Park Squaring
10' Niagara 14 gauge
6' Pexto New
6' & 8' Wysong & Miles 14 gauge, 10 gauge

RADIAL DRILLS
7' Cinc-Bickford Motor on Arm
6' Cinc-Bickford M.D.
6' American Motor on Arm
5' American M.D.
3' & 4' New Candey-Otto M.D.
4' American Hole Wizard, 11" column

SHAPERS
32" Ohio Universal M.D.—1943
32" Hendey M.D. late type
24" Hendey S. P., M.D. late type
24" Gould & Eberhardt M.D. late type
20" Gould & Eberhardt M.D. late type

TURRET LATHES
#1, 2, 3, 4, 5, 1A, 2A, 3A, 4A Warner & Swasey M.D.
#4 & #5 Midland M.D.

S & S MACHINERY CO., 140 - 53rd St. Brooklyn 32, N. Y. WORTH 4-5140

GEAR CUTTERS

NEW — H.S. STEEL • FIRST QUALITY

INVOLUTE 1P to 48P } *ALL LISTED*
BEVEL 3P to 24P } *PITCHES*

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DeWITT TOOL CO. 173 Grand St., N. Y. 13, N. Y.

BLISS #6 HEADERS

New Brit. Grid. No. 412 Auto. Chuckers (3)
NATCO 3 way Hor. Tapping Machine ⅜" cap.—45 spdls.
Model R, Seneca Falls Automatic Le-Swing Lathes
Foote-Burt 9 sp. Hyd. Drill, fixed spindles, No. 4 and No. 5 M.T. (5)
Rigid Turner 8 sp.
Lees-Bradner Model 40 Thread Millers
P&W—2 sp. Hor. Deep Hole Drill
Lapping Machines, Ultra Lap No. 20 (4)
Engine Lathe, 32"x14' Allianse G.H.
Turret Lathes, Denver Acme Model 6.2 (6)
Engine Lathe, 48"x32' Niles
Boring Mills—Vertical and Horizontal

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1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

STOCK TOOLS — *Prompt Shipment*

AUTOMATICS 3½" Cone 4-Spindle (4)
AUTOMATICS 1⅞" Cone 4-Spindle (1)
BOR. MILLS, 2½" bar, Cleveland, M.D.
BORING MILLS, 3" bar Universal.
BORING MILL, Hor. 3½" Landis Floor Type.
BORING MILL, 36" Bullard, "New Era".
BORING MILL, 40" King, 2 heads, M.D.
DRILL, Hvy. Duty, No. 513 Baker, No. 6 M.T.
GEAR SHAPER, #75 Fellows, M.D.
GRINDER, Internal, No. 72A5 Heald, 2 Mtr. Hyd.
GRINDER, Plain 14"x72" Norton
GRINDERS, Surf. Nos. 3 & 5 Abrasive
GRINDER, Surf. Hyd. G & L 14"x18"x72"—1942
GRINDER, Surface, No. 25 Heald Rotary
GRINDER, Univ. 12"x72" Cincl. Hyd.—1941
LATHE, 24"x16' B & E Grd. Hd.—1940
LATHE, 27"x18' Niles "Timesaver," Grd. Hd.
LATHE, 36"x22' N-B-P, Grd. Hd. Q.C.G.
LATHE, 38"x19' Putnam, Grd. Hd. Q.C.G., T.A.
LATHE, 42"x50' Putnam, Grd. Hd.
LATHE, Tur. No. 3 W & S (Late)
MILLER, Plain No. 1½ Milwaukee, S.P.D.
MILLER, Plain, Nos. 3S, 4 & 5 Cincinnati.
MILLER, Univ. No. 36 Van Norman
MULT-AU-MATICS, Bullard Type A, 6 Spdle.
PLANER, Openside, 36"x36"x12' Cleveland

PARTIAL LIST

LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

LATE TYPE TOOLS

#2MH Cinci. Univ. Miller 1944
#3SP Van Norman Miller 1942
Nos. 2, 3, 4, Cinci. Vert. Miller '42, '45
#2, 3, 4 & 5 W. & S. Univ. &
#3 J. & L. Univ. Turret Lathes
#712 Fellows Gear Generator, 1942
36H & 48H G.&E. Gear Hobbers
30"x15' centers Amer. Super Pro. Lathe
18" raised to 24½" x 192" centers, BB
Model Monarch, Carr. P R T., '42

BENNETT MACHINERY CO.
30 Church St. N. Y. 7, N. Y.

MODERN MACHINES

(Motors 3/60/220 & 440.)

Boring Mill 42" Bullard, "New Era".
Drill, #25—36" Foote-Burt, cap. 3".
Grinder, #13 B. & S., steel cabinet. (1945)
Grinder, G. & L. Surface, 16x72", Mag. Ck.
Lathe, 18—24"x14' centers Monarch, shuck.
Lathe, 606 Rivett BB., ⅛" HS; TA; QCG.
Lathe, 9x24" Hardinge, compound & collets.
Miller, #36-U. Van Norman, Index Head, subhead, rotary table and pump.
Riveter, Hanna, 36x24", cyl. 15", truss frame.
Shaper, 24" Rockford Hydraulic.
Shaper 24" Gould & Eberhardt, gear box, V-ram.

GALBREATH MACHINERY CO.
Empire Building Pittsburgh, Pa.

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MONA NUMBER

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

¾" x 10' Plate Shear—$8250.00
½" x 10' Power Press Brake—$4950.00

With electrical equipment, immediate delivery.

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6111 VERMONT AVE., DETROIT 8, MICH
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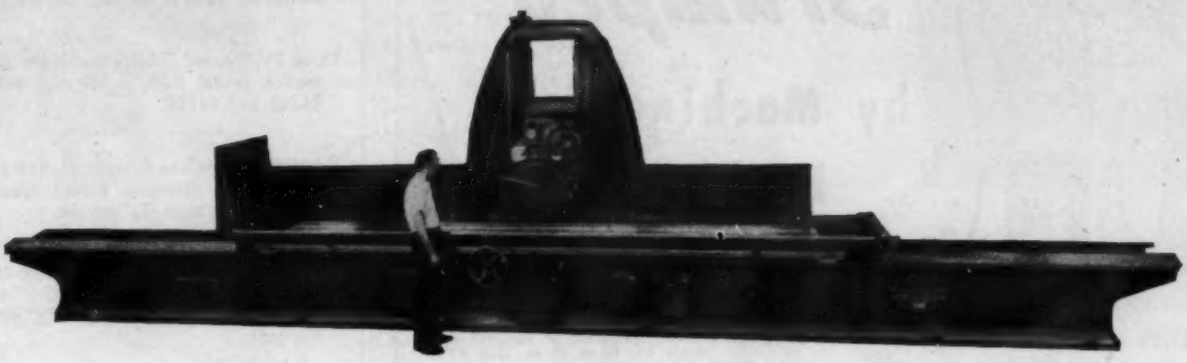
QUALITY *Machine Tools* NOW IN STOCK



30" x 24" x 192" Mattison High-Powered Precision Surface Grinder, with hydraulic table feed and wheel cross feed, power raising and lowering device to wheel head with hand control for fine adjustment; equipped with 4 magnetic chucks size 30" x 48", motors and controls. Latest model. Also 14 x 16 x 60 Mattison and 10 x 12 x 25 Thompson Hydraulic Surface Grinders.

AUTOMATICS

9/16" RA-6 Acme-Gridley. New in 1943.
1" RA-6 Acme-Gridley. New in 1943.
2⅝" RA-6 Acme-Gridley. New in 1943.
1⅝"—8 spindle Conomatic. New in 1942.
5½" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe. New in 1941.

BORING MILLS

★ **No. 41 Lucas Horizontal Boring, Drilling and Milling Machine, with auxiliary high speed drive to give spindle speed of 1200 RPM; with star facing head, dial indicator indexing device, motor and control. New in 1941.**

BROACHES

No. 28L LaPointe Hydraulic Horizontal. New in 1942.
No. CPC 8-24 LaPointe Hydraulic vertical. New in 1943.
No. CPC 5-36 LaPointe Hydraulic vertical. New in 1943.

DRILLS

★ **No. 26HO Baker Hydraulic, single spindle, 3" capacity in steel, with motor and control. Latest type.**
42" Cincinnati-Bickford, single spindle.
No. 1B Edlund Sensitive, single spindle. New in 1943.
No. 3 Avey, three spindle, heavy duty.
No. 3 Baush Multiple Spindle.
Barnes Horizontal Deep Hole, two spindle.
Taft Peirce Horizontal, double end.

GEAR CUTTERS

No. 22 Gleason Spiral, Hypoid and Zerol Gear Finisher. New in 1942.
25" Gleason Quenching Press.
No. 3616 Cleveland Rigidhobber. New in 1943.
No. 16H Gould & Eberhardt Universal Hobber. Latest type.
No. 7A, 7125A Fellows Gear Shapers.
No. 615A, 645A, Fellows Gear Shapers.
No. 3, 12 Barber Colman Hobbers.

GRINDERS

No. 2 Cincinnati Centerless, Filmatic spindle. New in 1941.
No. 3 Cincinnati Centerless.
14" x 48" Cincinnati Plain, Filmatic spindle.
10" x 36" Landis Hydraulic. New in 1943.
6" x 18" Cincinnati Hydraulic, Filmatic spindle. New in 1943.
No. 3 Brown & Sharpe Universal. New in 1943.
No. 13 Brown & Sharpe Universal and Tool.
★ **No. 36 Hanchett Vertical Rotary Surface Grinder, 36" chuck, 30 HP motor. New in 1943.**
No. 18 Blanchard, 30" chuck. New in 1942.
No. 75A Heald Internal. New in 1943.
No. 72-A-3 Heald Sizematic. New in 1943.
No. 16-16 Bryant Internal, Hydraulic, Used less than 2 years.

LATHES, ENGINE

Monarch Toolmakers 10" x 20" Model EE.
Pratt & Whitney Toolroom, 12" x 30". New in 1943.
Lodge & Shipley 16/20 x 48 (raised pattern). New in 1941.
Lodge & Shipley 20" x 48". New in 1943.
Monarch 24" x 84", helical gear.
LeBlonde 25" x 72", taper attachment.
★ **Bertram 28" x 240" "Timesaver", two carriages, with rapid traverse. Canadian made from Niles patterns. New in 1942.**
Lodge & Shipley 48" x 54", cone driven.
Hendey 16" x 6', yoke head.
Carroll Jamison 15" x 5', c.d.
South Bend 14½" x 6', c.d.
LO-Swing, IMP & LR.
Lipe Carbomatic, 15" x 30".
LeBlonde Production, 17" x 30".

LATHES, TURRET

Warner & Swasey No. 2A, preselector. New in 1945.
Warner & Swasey No. 1A, preselector. New in 1940.
Gisholt No. 1L, hydraulic speed selector. New in 1943.
Warner & Swasey No. 5 Universal. New in 1943.
Gisholt No. 5 Universal, Hydraulic speed selector. New in 1944.
Foster No. 5 Universal, Bar feed. New in 1943.
Warner & Swasey No. 4 Universal, preselector. New in 1943.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 3 Universal, two speed. New in 1942.
Bardons & Oliver No. 3 Universal, motor in base. New in 1941.
Warner & Swasey No. 2, oversize. New in 1942.
Bardons & Oliver No. 2, bar feed. New in 1941.
Brown & Sharpe No. 1, motor in base. New in 1941.
★ **Bullard New Era VTL, 36" x 42".**

MILLS

Van Norman No. 28U Universal.
Gorton No. 9J Vertical, with tracer.
Cincinnati No. 5 High Power, Plain.
Milwaukee No. 4H Plain. New in 1942.
Cincinnati No. 2MH Plain, latest model.
Cincinnati Universal, No. 3, motor in base.
Hydrotel, Cincinnati Vertical 28" x 60".
Cincinnati Vertical, No. 4, H.S. Dial.
Cincinnati Vertical, No. 3, Med. S. Dial.
Milwaukee Vertical, No. 2H. New in 1942.
Hydromatic, Cincinnati Duplex No. 3-36.
Ingersoll, adjustable Rail, 36" x 12'.

MILLS, HAND:

Nichols, late type, speed to 1200.
Van Norman, latest model.
Whitney No. 6.
Standard No. 1.

MISCELLANEOUS

No. 7 Kling Punch, 1¼" through 1", 72" throat.
No. 8-6 Zeh & Hahneman S.S. Geared Press.
Pratt & Whitney Profiler, No. 12B.

PLANERS AND SHAPERS

Cincinnati Planer, 42 x 42 x 20, D.C.
American 20" & 24" Shaper.
Gould & Eberhardt 24" Shaper.
Cochrane & Bly No. 14 Vertical Shaper.
Pratt & Whitney 6" Vertical Shaper.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSE

INDIANAPOLIS
MACHINERY & SUPPLY CO., INC.
1961 S. Meridian St., Indianapolis 6, Indiana
EASTERN BRANCH: 44 WHITEHALL ST., NEW YORK
MEXICO OFFICE HIDALGO ORIENTE 2-535-B. MEXICO, D.F.

LATHES

1—Bridgeford 36"x56', 15 speed, grd. hed. Eng. Lathe, M.D. AC elect. equip. power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 26" over carr., dist. betw. cens. 48', mtzd. apron and taper attmts.
McCabe 24"x40"x12', dbl. spin., motor driven, Eng. Lathe; sw. over top spin. 41¾", sw. over lower spin. 24½", dist. betw. cens. 84".
1—Monarch EE 10"x20" Sensitive Precision Toolmakers' Lathe, motor driven, sw. over bed 12½", dist. betw. cens. 20", taper attmt.

BORING MILLS

1—Univ. #3-A Hor. Bor. Mill, diam. bar 3", No. 5 taper, rapid mill. feeds, size of tbl. 24"x48", cross feed to tbl. 36", dist. to outer sup. 60", vert. feed to hed. 26", wght. approx. 11,200 lbs. M.D.
1—Yoder #3A Hor. Bor. Mill, diam. of bar 3", Morse Taper #5, dist. to outer support 72", bar trav. 24", latest type, motor driven.
2—Bullard 36" "Spiral Drive", Vert. Bor. Mill, face of turret to tbl. 34", clear under cross rail 27½", vert. trav. of turret 26⅜", clear under S.H. slide 10", 3 and 4 jaw chuck, approx. wght. 17,500 lbs.
1—1-14' Sellers, Vert. Bor. Mill, 2 heds. on cross-rail, stroke vert. slide in saddle 40" height under cross rail heds. 9" 6-13/16", diam. largest swing to clear uprights 140", diam. tbl. 9", gr. box drive, rap. trav.

PLANERS

1—Putnam 84"x84"x40' Dbl. Hous. Planer, Revers., M.D. and controls, 2 heds. on cross rail, 2 side heds., just taken out of service.
1—Gin. 60" Planer, 72"x60"x32', 2 heds. on cr. rail, 2 side heds., tbl. wkg. surf., width 60", 31' long, thickness of box tbl. 9", AC, M.D.

MILLING MACHINES

1—Milwaukee No. 3B Univ. Miller, tbl. wkg. surf. 55"x15", 3 jaw Univ. chuck, feeds: long. 30", cross 12", vert. 20" spin. speeds 18, range 13-320 RPM, AC motor driven.
B. & S. #1 ½A Bk. Grd. Constant Speed, Univ. Miller, tbl. wkg. surf. 36⅛"x10¾", power feeds long. 24½", cross 7⅛", vert. 19", AC motor driven.
1—Milwaukee #2K Vert. Milling Machine; tbl. wkg. surf. 56"x12"; range long. 28" vert. 14", cross 12", spdle speeds 24, range 15 to 1500 RPM, latest type.
1—B. & S. #2 Vert. Mill. Machine, stand type, tbl. wkg. surf. 54¼"x14", power feeds long. 28", cross 12", vert. 14".
1—Kempsmith #2, Type G, rap. trav., Pl. Hor. Miller, tbl. wkg. surf. 45"x10", feeds long. 28", cross 10", vert. 18", vert. hed.
Cin. #3 Pl. Hor. Miller, rect. overarm, tbl. wkg. surf. 55¾"x13½", range: long. 34" cross 12", vert. 20", power rap. trav.

PRESSES

E. W. Bliss #3½, dbl. action, Crank & Toggle Press, stroke of blank holder 8", stroke of plunger 12", wght. approx. 16,200 lbs., M.D.
1—Toledo #57, straight side, Geared Press, dist. betw. uprights 24½", hole in bed 14"x14", stroke 18", wght. approx. 18,000 lbs., M.D.

GRINDERS

1—Mattison Hyd. Surface Grinder; cap. 12"x16"x 54".
1—Heald #25 Hydraulic Rotary Surface Grinder, magnetic chuck and switch; chuck wkg. surf. 10", max. dist. chuck to cent. 14", minimum dist. chuck to cent. 4¼" sw. inside water pan 20".

AUTO. SCREW MACHINES

1—Acme-Gridley Model B 2¾", 4 spin. full automatic, overhead forming slide, threading spin., considerable tooling, A.C. elect. equip.
1—B. & S. No. 2 Full automatic, capac. ⅞", turn lgt. to 3" feeds any length to 4".

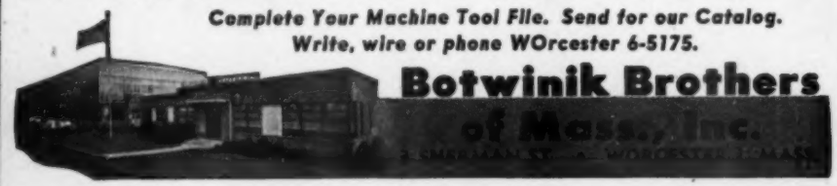
SHAPERS

1—American 16" Crank Shaper, M.D. stroke 16¾", hor. trav. of tbl. 24", vert. trav. of tbl. 11⅞".
1—Milw. 20" Crank Shaper, auto. cross trav. 20¾", vert. adj. of tbl. 24", net wght. 3300 lbs., motor driven.

MISCELLANEOUS

1—Fairbanks-Morse, 2 cylinders, 2 cycle, 12"x15", Diesel Engine, Model No. 32E12, Generator capac. 76.8 K.V.A., 550V, 3 phase, 60 cycle, capac. 120 HP.

Complete Your Machine Tool File. Send for our Catalog.
Write, wire or phone WOrcester 6-5175.



Botwinik Brothers of Mass., Inc.

UNUSUAL ITEMS

No. 5-60 Cincinnati Hydromatic miller with flywheel on spindle and 50 HP motor for carbide milling.

Three 2⅝" Acme Gridley 6 spindle automatics, model RA6, serial nos. 84448, 84263 and 84243.

No. HP50 Lapointe horizontal hydraulic broach with extension broach support. Capacity 25 tons, 72" stroke.

4¾" bar, No. 300 Giddings & Lewis floor type boring mill with 10'x10½' base plate outer support and 54"x72" rotating table.

96" Cincinnati; "Massive Pattern" vertical boring mill arranged for AC motor drive and having power rapid traverse.

Baker heavy duty drills. Sizes 121, 217, 217 three spindle, 310, 314 & 315.

34 spindle, No. 30 Natco multiple drill with 22" x 38" drilling area.

Twenty-one No. 12H Gould & Eberhardt heavy type universal gear hobbers.

Nos. 2 & 3 Cincinnati centerless grinders, late type with Filmatic bearings.

10"x96" Cincinnati type ER plain cylindrical grinder with Filmatic bearings. Brand new.

12"x16"x48" Thompson surface grinder with hydraulic traverse and hydraulic feed.

84"x48"x12' Liberty convertible openside planer with 2 rail and 1 side head, power rapid traverse, forced feed lubrication and variable voltage drive & MG set.

1000 ton, No. 666 Toledo knuckle joint coining or embossing press. 5" stroke, 32" between uprights, 29¾" shut height.

70 ton No. 4B23 Verson all steel straight side press permanently inclined. Has air cushion. 3½" stroke, 13" shut height, 23" between housings.

24"x96" centers Monarch model M engine lathe. Late type with flame hardened ways.

MILES MACHINERY CO.
SAGINAW, MICH.

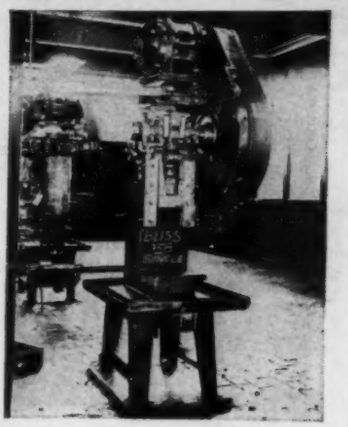
National Bent Shank Nut Tappers—Battery of ⅝" and ⅞" Machines.
2 Landis ¾" Bolt Formers and Threaders, M.D.
1 National ½" to 1" Hot Bolt Head Trimmer
Woodward & Powell 42"x42"x36 ft. 4 Head Planer
Cincinnati 36"x36"x16 ft. Planer, M.D.
1 Lodge & Shipley 36" Swing by 44 ft. Bed, Selective Geared Q.C. Lathe, M.D.

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

B4B NATCO 48-spdl. Holesteel Drill
3'-11" American Hole Wizard Radial
#12 Landis Centerless Grinder
16"x24"x72" Mattison Surface Grinder
6"x18" Norton "C" Hydraulic Grinder
6"x30" Norton "C" Hydraulic Grinder
#124B Kearney & Trecker SIMPLEX Miller
#3HS Cincinnati Vertical Miller
#2—#3—#4—#5 Warner & Swasey Universal Turret Lathes
#1 Brown & Sharpe Wire Feed Hand Screw Machines

ALL LATEST TYPE MACHINES

HAZARD BROWNELL
350 Waterman St., Providence 6, R.I.



BLISS No. 58

FOR QUICK SALE—FROM STOCK

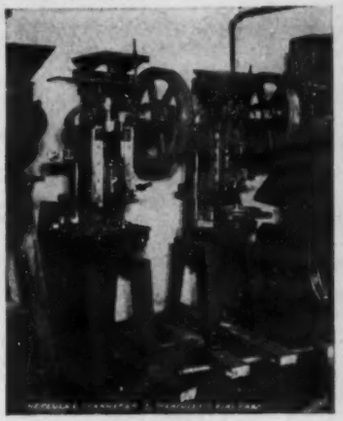
SPOT DELIVERY

Brakes—New Lynn 56" x 14 G Hydraulic Press, Motor ($1650.00)
D & K 8' x 16 G Apron, Motor ($575.00)
D & K (Press) 12½' x ⅜"

Shears—Pexto 5' x 16 G ($475.00)
Geo. Ohl 8' x 12 G, Motor
Morgan 10' x 1½" cap. (25% of cost)

Saw—Doall contour 16" (1945)

Spot Welders—Sterling (New) 10, 15, 20 & 30 KVA



HERCULES
1 TRANSFER—1 DIAL FEED

Ironworker Pels #24 Punch, Shear, Coper. 6" x 6" x ¾" cap.

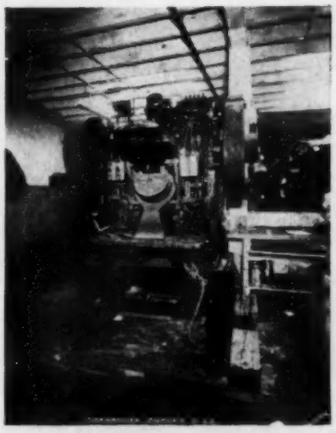
New Press Brake —10' x ⅜"—all steel—30-60 days delivery.
New Square Shear—10' x ⅜"—all steel—30-60 days delivery.

Rolls, Bending, 20' x 1" cap. Initial type, Drop End

POWER PRESSES

MAKE	TONS	STROKE	DIE SPACE	TYPE
Bliss #19	17	1"	9½" x 17½"	OBI (Bargain—$375)
(10) Hercules (1942)	22	3"	10" x 14½"	Dial and Hopper ($400 each)
(10) Hercules (1942)	22	6"	10" x 14½"	Feed Transfer ($400 each)
		3" Ram		
(10) Wat-Farrel (1942)	25	3" Table up	12" x 21½"	Double or Single Action, Dial Feed ($500 each)
(3) Bliss #58 (1943)	20	5"	12¼" x 13½"	3 HP Motor 3/60/220 & 1/15 HP Motor
(4) Ferracute C22 Duplex 2 Presses on 1 stand (1943)	20	5½"	13½" x 14"	Pinwheel Feeder & Hopper, Two 3 HP Motors, 3/60/220-440 plus two ¼ HP Motors
(2) Bliss #62A (1943)	30	8"	14" x 24"	Pinwheel Feeder & Hopper, 3 HP Motor, 3/60/220-440 plus 1/15 HP Motor
Federal #3 (1943)	30	8"	14" x 24"	Pinwheel Feeder & Hopper, 3 HP Motor, 3/60/220-440 plus 1/15 HP Motor
Torrington	50	2" & 1"	23" x 16"	Sub Arch Press, Double Action Cam
Bliss #4 Header (1943)	56	8" & 6"	1½" x 2⅜"	Horiz. Double Header, Single Die
Toledo #54	60	3"	18" x 18"	SS with side shear
Bethlehem	88	2½"	62" x 58"	SS Double Crank, Single Action
Bliss #5	90	5"	22" x 30"	SS Single Action
Bliss #6	125	5" & 2"	24" x 32"	SS, Dble or Single Action, b.g.
Bliss #7	180	5" & 2"	28" x 36"	SS, Dble or Single Action, any Stroke up to 5", b.g
Clearing (F1200-42)	200	Any stroke up to 26"	36" x 42"	Steel, SS
(2) Bliss #77½	250	12" & 14"	30" x 29"	SS Single Action, b.g.
(4) Bliss #78½	450	16"	36" x 36"	SS Single Action, b.g.
	1200	23½"	59" x 50"	SS Single Action, b. g.

(Subject to Prior Sale)



FERRACUTE
DUPLEX No. C22

KINGS COUNTY MACHINERY EXCHANGE

394 ATLANTIC AVENUE

BROOKLYN 2, N. Y.

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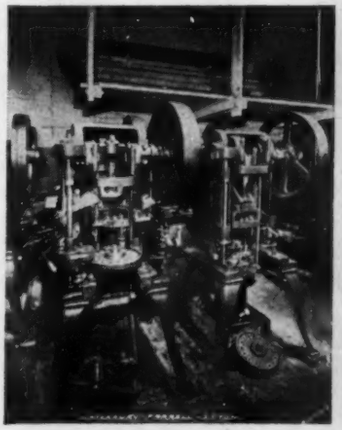

WATERBURY-FARREL
25 TON

UNITED MACHINE TOOLS

2—2" GREENLEE—6 Spdl.—Automatic Screw Machines—MD—1942 Mfg.

DRILLS

4'9" CINCINNATI-BICKFORD Super Service—RADIAL—elec. col. clamp—2 speed motor—220/440/3/60 tapping attachment—LATEST TYPE AND DESIGN—1943 Mfg.
3'11" CANEDY-OTTO—RADIAL—motor on arm—220/3/60/1800—LATE TYPE 1942 Mfg.
#3MS LELAND-GIFFORD—3 spdl.—12" BG—Power feeds on all spdls.—LATE TYPE—4 speed motors—440/3/60—#3MT
3'9" AVEY—Sensitive—RADIAL—Belt drive
21" CANDEY-OTTO—BG—Upright—#4MT—220/440/3/60—PF to spdl. V Belt drive—NEW
16" SIPP—4 spdl.—Sensitive—#2MT—Belt drive
16" ALLEN—4 spdl.—Sensitive—#2MT—Belt drive
16" CANEDY-OTTO—Floor and bench—Sensitive—½" chucks—110/1/60 NEW
16" AVEY—floor—2 spdl.—Sensitive—BD

GRINDERS

#2 CINCINNATI—Centerless "Filmatic"—220/440/3/60—thru feed work rest—infeed work rest and infeed attachmt—LATE TYPE 1943 Mfg.
#2 CINCINNATI—Tool and Cutter—220/440/3/60—Universal—large assortment of accessories—LATE TYPE—1941 Mfg.
#TG-12 GRENBY—Internal—High speed—PF—LATE TYPE
10x48 MAJESTIC — Cylinder — 220/3/60 — mtzd. work head—mtzd. wheel head—pump—piping—LATE TYPE—1943 Mfg.
10x24 NORTON—Special—Cam Grinder—Mtzd.
#2 BROWN & SHARPE—Surface—6x18—hand feed—MD—220/440/3/60—1943 Mfg.
6x18 MONARCH—Surface—Hand feed—Xlo mtzd. Spindle—550/3/60 with chk.
#60 HEALD—Cylinder—motor driven—very clean—taken out of service.
10x24 LANDIS—Universal—Hydraulic—Model C—1944 Mfg.—Used 3 mos.
12 x 48 CINCINNATI—Universal—Hydraulic—1942 Mfg.

LATHES and TURRETS

16x6' SEBASTIAN—Type R-8 speed—Geared Head—Timken. Spdl.—NEW
20x54" REED-PRENTICE—16 speed—Geared head—Taper attach.—220/440/3 with additional equipment—LATE TYPE—1942 Mfg.
14x30" LODGE & SHIPLEY—12 speed—motor in base—TA—chuck—stops—4 way tool post—220/440—other equipt.—1941 Mfg.
14½x6' SOUTH BEND—chucks—motor in base—LATE TYPE—1943 Mfg.
14x6' HENDEY—Geared head—factory MD—chucks—less mtr.
16x6' HENDEY—QCG—Taper attach.—chuck—collets—MD.
#3 JONES & LAMSON—Universal Turret—220/3/60—with bar feed and extras—LATE TYPE—1943 Mfg.
#4 MOREY—Universal Turret—with bar feed—chuck—face plates—turret tools and numerous collets—LATE TYPE—1943 Mfg.
#2 WARNER & SWASEY—PF to turret—cross slide—BD—arr. MD.

MILLING MACHINES

3H K & T "Milwaukee"—Vertical—Power feed to head—Rapid Traverse—LATE.
2H K & T "Milwaukee"—Plain Horizontal—Power Rapid Traverse—LATE TYPE.
#3K K & T "Milwaukee" Plain Horizontal—Power rapid traverse—220/440/3/60—motor in base—LATE TYPE—1943 Mfg.
#2K K & T "Milwaukee" Plain Horizontal—Power rapid traverse—220/440/3/60—motor in base—LATE TYPE—1943 Mfg.
#3 CINCINNATI—dial type—Plain horizontal—power rapid traverse—220/3/60—LATE TYPE—1942 Mfg.
#34 OHIO—"Osterlein"—Universal—Belt drive—new dividing heads.
#2 GARVIN—Plain horizontal—belt drive
GARVIN—hand—lever feed table—belt drive—stationary spdl.
#1 ROCKFORD—Plain horizontal—Drive—All MD—3 Tee slot.
#5 BECKER—Vertical—belt drive—motor bracket—12x48" table.
2-24 CINCINNATI—Rise & fall—LATE TYPE—1942 Mfg.

PRESSES

DP53 FERRACUTE—40 ton—SS—motor driven—220/3/60—Plain—with side shear 1940 Mfg.
#3K PERKINS—screw—NEW

SAWS

#4C COCHRAN-BLY—Cold—inserted tooth blade—MD—220/3/60
8x16 KALAMAZOO—Metal Cutting hand—110/1/60—motor—equipment—contour sawing attachment—NEW

SCREW MACHINES

#0G BROWN & SHARPE—fully automatic—vertical slide attachment—Serial number over 7000
#00G BROWN & SHARPE—fully automatic—ser. # over 17,000—motor driven slotting attachment—LATE TYPE—1943 Mfg.
#00G BROWN & SHARPE—fully automatic—ser. # over 14,000—motor driven slotting attachment—swing stop—other equip.—LATE TYPE.
#00G BROWN & SHARPE—fully automatic—ser. # over 11,000—motor driven slotting attachment—swing stop & equip.—LATE TYPE
#R4 NATIONAL ACME—4 spdl.—fully automatic—3½" Cap.—220/440/3/60—complete assortment of equipment—LATE TYPE
#0 BROWN & SHARPE—fully automatic—belt drive
#R NATIONAL ACME—4 spdl.—fully auto.—1⅜" cap.—LATE TYPE—extra equipt.

SHAPERS

16" GEMCO—"Lubrigard"—220/3/60—power rapid traverse—heavy duty—NEW
28" AMERICAN—back grd.—power feed to head—single pulley drive.
24" GOULD & EBERHARDT—crank—motorized with 4 speed drive—CLEAN
7" LOGAN—floor type—110/1/60—NEW

SHEARS

36" PEXTO—Power squaring—motor drive—16 gauge.
42" WHITNEY—Power squaring—motor drive—220/3/60—16 gauge—NEW

MISCELLANEOUS

DIE FILER—Thiel—#3—motor 220/3/60
DIE FILER—Harvey "Butterfly"—Model EL—110/1/60—NEW
PLANER—Woodward—Powell—60"x60"x12'—2 rail heads—1 side head—Boxbed.
PLANER—Woodward & Powell—48"x48"x20'—MD
PLANER—Whitcomb—24"x24"x6'—Arr. for motor drive—less elec. equip. 1 rail head.
SHEAR CUTTER—Williams & White—3" Cap.—Wt. Approx. 30,000 lbs.
HAMMER—Bliss—300#—board drop.
CLUTCH CUTTERS—Waltham
PROFILER—Pratt & Whitney—#13—Gear driven.
SUPERFINISHER—Foster

UNITED MACHINERY & TOOL CORPORATION

34 HERMAN STREET — **WORCESTER 8, MASS.**

LATE MODELS OF MACHINE TOOLS FOR EARLY DELIVERY

BORING MILLS

42" BULLARD Vert., M.D. Spiral Drive
#360-F GIDDINGS & LEWIS, Floor Type, M.D.
#560-F GIDDINGS & LEWIS, Floor Type, M.D.
#44 UNIVERSAL Tri-Way, Table Type.

GRINDERS

#2 B & S Surface, M.D.
#2 REID Surface, M.D.
#10 B & S Tool & Cutter, M.D.
#72A3 HEALD Plain & Sizematic, M.D.
#4T SELLERS Tool Grinder, M.D.
9" P & W Hyd. Gear Grinder, M.D.
#5 B & S Plain Grinder, M.D.
#11 BLANCHARD Rotary, 16"x20" chucks
6—#4H LANDIS 4"x12" & 4"x18" Plain Grinders, M.D., with hyd. straight infeed, hyd. timer & hyd. footstock.

LATHES

AMES Precision Bench Lathe, 1" Collet Cap., M.D.
14"x54" LODGE & SHIPLEY G.H. Lathe, M.D.
12" & 14" x 30' LODGE & SHIPLEY G.H. Lathe, M.D.
16"x30" MONARCH Mod. "C" Lathe, M.D.
16"x6' SEBASTIAN Lathe, M.D.
24"x108" centers MONARCH Mod. "N", M.D.
50"x17" centers LEBLOND "BIG SWING" Lathe, M.D.

MILLING MACHINES

#5/60 CINCINNATI, Duplex Hydromatic Milling Machine, tracer control mechanism for automatic rise & fall of spindle carriers, M.D., machine used six months.
#1G & 2G KEMPSMITH All Geared Univ., M.D.
#2H K & T Vert., Power Feed, M.D. (3)
#2MS CINCINNATI Dial Type, Plain, M.D.
#4MS CINCINNATI Dial Type, Plain, M.D.
#3HS CINCINNATI Dial Type, Vert., M.D.
#5H KEARNEY & TRECKER Plain, M.D.
#M-50A TAYLOR & FENN Vert., M.D.
#12-M MOREY 2-spdle PROFILER, M.D.

TURRET LATHES

#0G B & S Auto., M.D.
#0 B & S Wire Feed Screw Machines, M.D.
#2G Morey Ram Type, M.D.
#2 B & O Geared Elec., M.D.
#3 W & S Ram Type Univ., M.D.
#3 J & L Ram Type Univ., M.D.
#1A W & S Saddle Type Univ., M.D.
#2A W & S Saddle Type Univ., M.D.
#4A W & S Saddle Type Univ., M.D.

MISCELLANEOUS

6'x48" THOMPSON Broach Grinder.
#36-H GOULD & EBERHARDT Gear Hobbers.
1½" Dble. Head LANDIS Thdg..Mach..M.D.
Used Bases for 4' & 6' CINCINNATI BICKFORD Radials
#4—48" B & S Gear Cutter
40"x32"x51" OHIO Tilting & Revolving Rotary Table.

WIGGLESWORTH MACHINERY CO.

203 BENT STREET — **CAMBRIDGE, MASS.**

McDONALD
USED MACHINERY

G & E 24" Cin. 32" Shapers
Cleveland O.S. Planer 36"x8', 2 hds.
Abrasive #34 M.D. Vert. Surf. Grinder
Cincinnati D. H. Planer 36"x36"x10', 2 hds.
Monarch 20" grd. hd., M.D. Lathe 16 sp. Speeds Model "M"
Bullard Vert. Turret Lathes, 24" & 36" S. Head
Defiance 3" Horiz. Boring Mill & Univ. #3-A
L & S 18x12' & 20'x10' 20"x8' Grd. Hd. M.D. & 28"x12' Lathes Monarch Model "C"
American 24'x12 grd. hd. lathe, m.d. q.c.g.
Amer. 4-ton vert. Hydr. Broach
Blanchard Vert. Surf. Grinder, 26 rd. chuck.
Cincinnati #2 Centerless Grinder.
Colburn 60" & 72" Vert. Boring Mills.
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd. S.P.D. Pl. Miller.
Milwaukee No. 3-B Vert. Miller grd. hd., m.d.
Cin-Bick 3' Super Serv. Radial
Gisholt 3R Grd. Hd. M.D. Turret Lathe
W.&S. No. 2A grd. hd. Univ. Turret Lathe, S.P.D.
Foster No. 2F Fostermatic grd. hd. Turret Lathe, M.D.

MONA

McDONALD MACHINERY CO.
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Doall Surface Grinder 8x24 Selectron
Marvel 6A Hacksaw, M.D., Auto. Feed
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2½", 4" Binsee
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Bullard New Era 24", 42", Vert. M.D.

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Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
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Acme #2 M.D.

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#25 Gallmeyer & Livingston Hyd. Surface
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12" Heald Rotary, Arter 12" M.D.
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Norton 6x18" Hyd. Surface, M.D.
Covel #91A Tool & Cutter New 1941

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Monarch Hendey 12x30, 10x20 G.H. Late
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#12 #22L Van Norman, Duplex
#2B K & T Univ.; No. 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6, Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No 1, 3, Vert.
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Wiedman Turret Punch—Type R4P
Oliver No. 610 Drill Pointer
Buffalo #0 Angle Roll M.D.
#20 Bliss OBI, #58-OB Gap Presses
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
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#4 Gisholt
18x54 American Pacemaker
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12x30 LeBlond
16x54 LeBlond
14x54 Hendey

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#3K Kearney-Trecker Horiz. Mill
#3H Kearney-Trecker Horiz. Mill
#2K Kearney-Trecker Vertical Mill
#2-18 Cincinnati Prod. Mill

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2 Spindle Edlund Drill Press
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MISCELLANEOUS

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Grob W.S. 36" Band Saw
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#4B B&S Plain, DOA, PRT, AC MIB
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Cincinnati 375 ton, 8'8" overall, 6'6" bet. housings, ⅜" cap.
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30" x 12' Boye Emmes G H
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3½' Cincinnati Bickford
4' Carlton, motor on arm
7' Carlton, motor on arm
8' American, motor on arm

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3-A B & S Universal
1-B Milwaukee Universal

BORING MILLS

24" Bullard, New Era
84" Cincinnati 2-swivel heads
12' Betts 2 swivel heads
12' N.B.P. 2 swivel heads
16-24' Niles extension type
3" spindle Universal Tri-Way No. 33 Lucas table type
4½" spindle No. 33 Lucas

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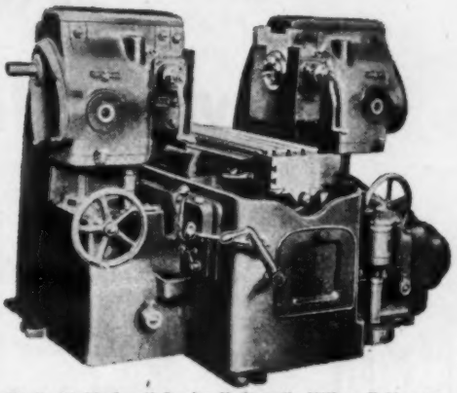
150" Muir gear Hobber
100" G & E gear Hobber
18' Power Plant Hobber
40" P. P. Pinion Hobber



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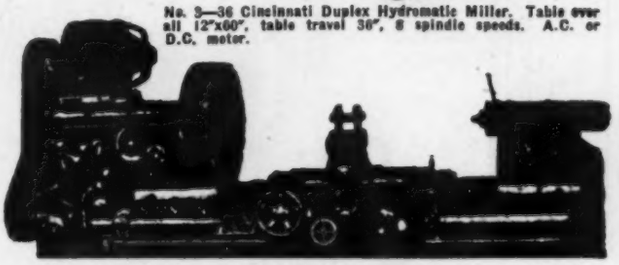

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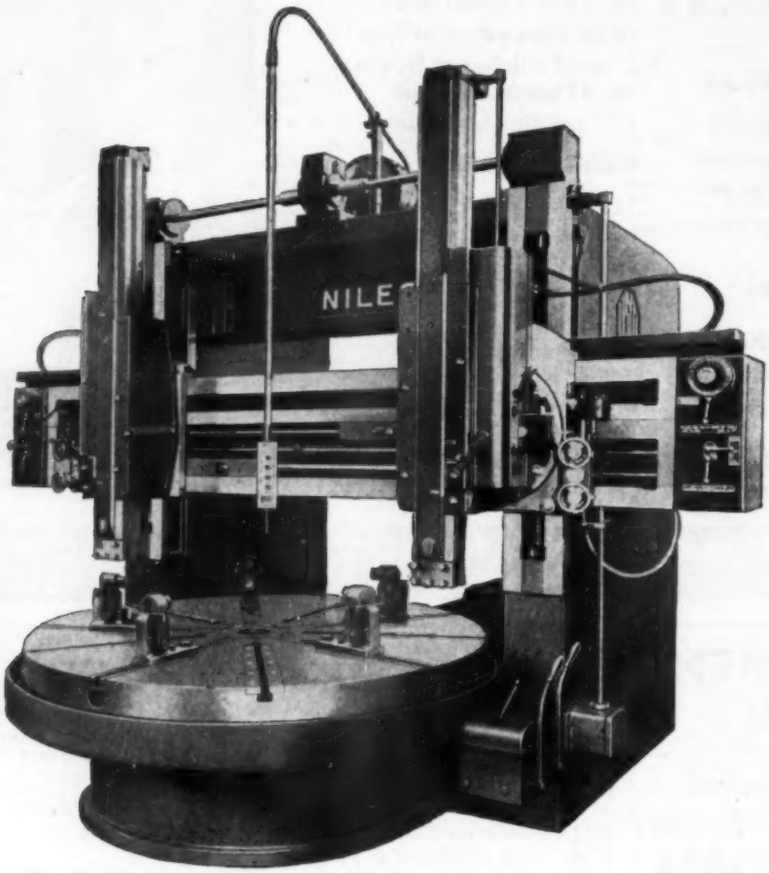

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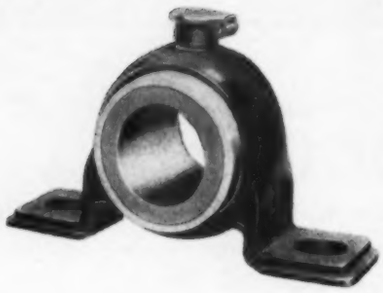

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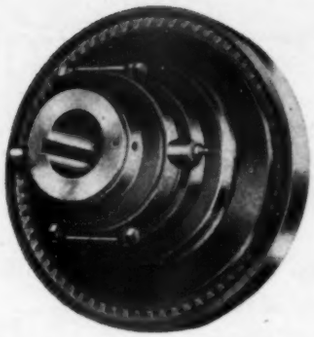

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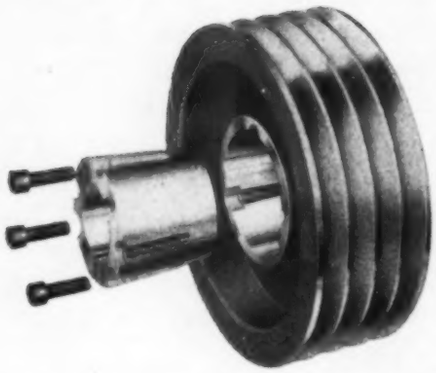

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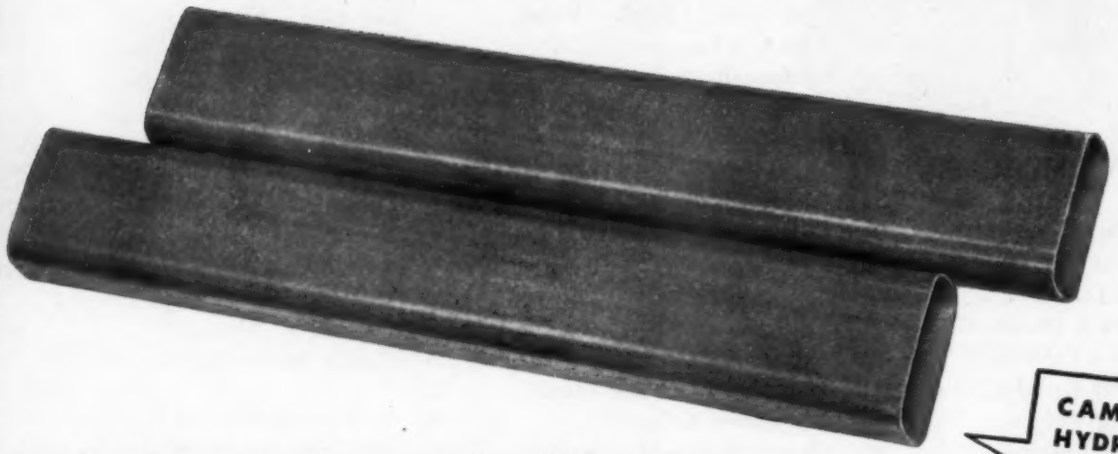
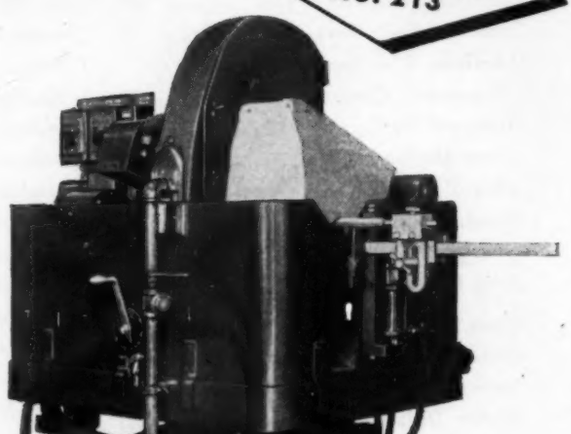


CAMPBELL HYDRAULIC NO. 213



Production more than quadrupled over other methods by putting this operation on Campbell 213 Wet Abrasive Cutting Machine.

BRIDGEPORT, CONN.—The tubing illustrated is 1¼" x 2¼" with 1/32" wall. Because of its shape it presented a problem when cut by ordinary methods. By putting it on the Campbell 213, actual cutting time was reduced from more than half a minute to only 2 seconds per cut. Result—faster cuts to close tolerances, no distortion, minimum burr.

Campbell offers a complete range of abrasive cutting machines, including wet and dry, hand-operated, semi-automatic and full automatic. They are more than just cut-off machines. In many cases, we have designed fixtures which adapt abrasive cutting to operations such as this tube-cutting job formerly done by other types of machines. And the result has been greatly reduced production costs.

***Perhaps you have operations** which could be profitably done by abrasive cutting. Our engineers will be glad to work with yours.*

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ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE • BRIDGEPORT, CONN.

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SWAN-FINCH CASE HISTORY No. 669
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Operation: Milling tool steel.
Mix: After switch to SAFCO 770 Soluble Cutting Compound best results were obtained at 30 to 1 mix.
Performance: When SAFCO 770 replaced former emulsion, time between tool grinds increased 10%. Cooler work permitted finishing cuts to closer tolerances.
EXTRA benefits: No more rusting, clogging of machines, or objectionable odor.

performance tests prove

outstanding advantages

FOR USER OF SAFCO 770 SOLUBLE CUTTING COMPOUND

Typical of the many concerns who've reaped rich rewards from switching to a "custom-made" Swan-Finch cutting and grinding compound is this case history. Typical also is the completeness of the Swan-Finch service engineer's tests. He made sure that the customer got what he wanted: "no rusting, no odor, increased tool life." His interest and concern – as well as the excellence of the Swan-Finch lubricant – made this performance, these savings, possible.

Call in a Swan-Finch service man and profit from his visit. He's backed by Swan-Finch's 95-year-old reputation for supplying the *right* compounds for *all* metal working needs. There's no obligation, *no interruption to production*, involved.

Send for the new bulletin "Metal Working Lubricants."

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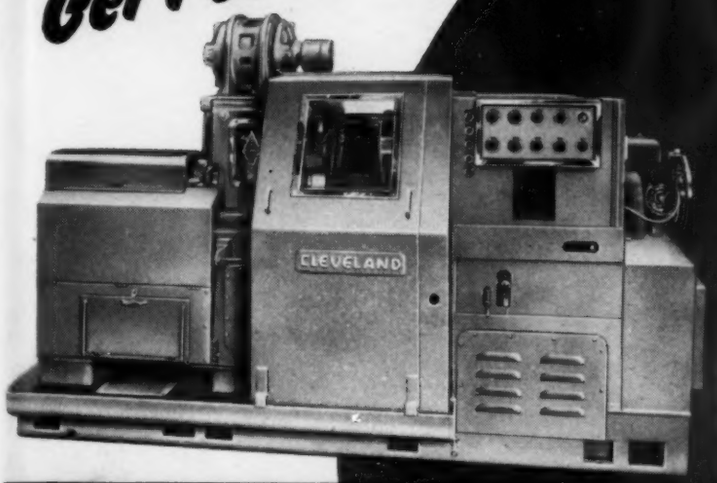


Model AB 2½" Single Spindle Automatic

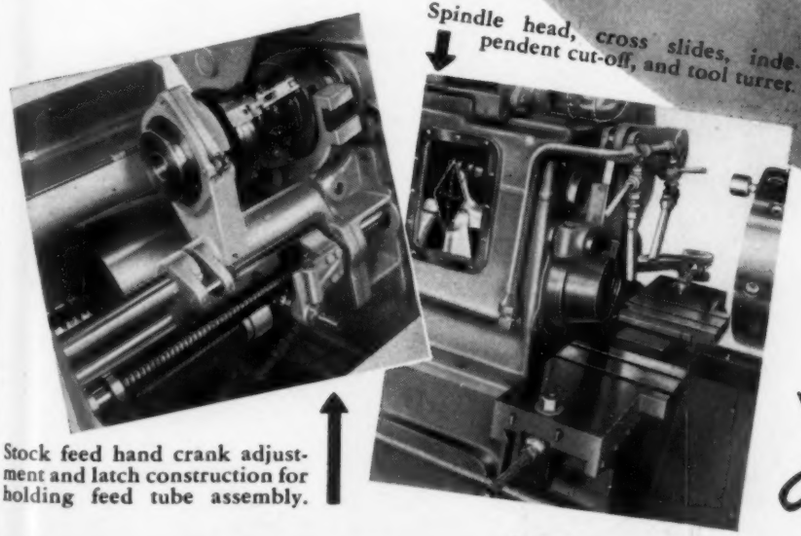
Design and Construction Features

The new Model AB *Dialmatic* Cleveland sets the pace in single spindle automatic screw machine design. Listed below are the principal construction highlights. Some are time-tested features which have made Cleveland the leader in its field for nearly 60 years—others are highly advanced improvements. All combine to greatly increase the speed of set-up and flexibility of control vital for higher production at lower cost.

- Universal camming
- Infinitely variable electric tool feed drive
- High speed index independent of tool feed
- Four automatic spindle speeds
- 112 speed selections from 24 to 1820 rpm.
- Hand crank stock feed adjustment
- Timken bearing equipped spindle
- Draw-in type chucking
- Geared anti-friction spindle head
- Five hole turret
- Double cross slides
- Oil feed through turret
- Pump driven lubricating system
- Coolant system with pump drive
- Convertible to a chucker
- Independent cut-off

Electric panel showing feed calculating chart and separate dials for controlling forward and return feed for each turret position.

Spindle head, cross slides, independent cut-off, and tool turret.



Stock feed hand crank adjustment and latch construction for holding feed tube assembly.

Write now for *complete* information

Remember,

Cleveland's Cut Costs

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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He gives bearings a rub-down to put curves in the right places

. . . for faster operation, greater accuracy, maximum load capacity

IN the final manufacturing process, Timken T-type thrust bearings are assembled and processed so that the surfaces of the ribs, rollers and races are generated as a unit. The bearing thus becomes a "Generated Unit Assembly".

This extra process produces a smoothly-curved area of contact between the end of each roller and the cone rib against which it operates, so that the convex shape of the roll end and the concave surface of the cone ribs are identical in contour.

We developed this process years ago for thrust bearings which must operate under extreme loads with high roll end pressures against the cone ribs and since have adapted it to other Timken bearings, including those used for precision machine tools, steel mill and railroad equipment and other applications.

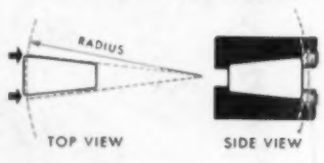
Today "Generated Unit Assembly" reduces friction and wear to the vanishing point; increases load capacity; assures positive roll alignment; eliminates the need of breaking-in or final adjustment on the job; and lengthens bearing life. It is one of the many reasons why it pays to have Timken bearings in every machine you manufacture or buy.

REMEMBER, Timken bearings are produced by the only bearing manufacturer in the country making its own steel and Timken is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels. The Timken Roller Bearing Company, Canton 6, Ohio.

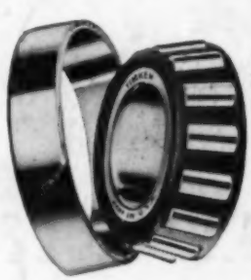
GENERATED UNIT ASSEMBLY

Extra manufacturing process makes Timken heavy duty thrust bearing a "Generated Unit Assembly".

CURVED AREA RIB CONTACT



Curved area of roll end (at arrows) fits perfectly the curve of upper and lower ribs of this thrust bearing.



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